

COAL AGE

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Even Country Storekeepers May Strike

By R. DAWSON HALL



It is reported that the mine worker, who has struck against the production of coal for the use of the storekeeper and others, is much incensed that the storekeeper refuses to give him goods on credit. A man with unwarped judgment would be disposed to expect that the storekeeper would strike against all and sundry who went on strike against him.

The merchant in the mine village is not so clearly conscious that the strike is directed against his interests, and he is willing to sell his goods to the strikers so long as they have the money to pay for them, and to leave "politics", as he would term it, entirely alone. He does not see his way clear however to help the strike by selling goods on credit, especially as the credit has often been found bad.

By purchasing goods at the village store the mine worker has patronized the storekeeper and he lays great stress on the favor he has conferred upon him. Now in high dudgeon, he says that he will do so no more. Has not the mine operator patronized the workingman for years by purchasing his labor, and is not the mine worker bound to the operator by this fact in just the same manner as the storekeeper is bound to the mine worker?

If buying goods of a store is conferring a favor on the store, buying the labor of a man, often the only thing he has to sell, is conferring a favor on that man. If the miner is justified in striking, so is the storekeeper; for the moral obligation to continue the relation of mutual service is equally binding in both cases.

The promise of the mine worker that he will build a rival store as soon as the strike is over and

so ruin the storekeeper who will not back the mine worker's strike by unlimited credit is also interesting. The striker, by hiring men to run a co-operative store, puts himself in the position of hiring strike breakers. He would blacklist the storekeeper and put him off the job because he ventured to strike and so inconvenienced his master, the mine worker.

All this is extremely human. In common with some great statesmen, here and abroad, the mine worker enunciates great principles, but fails to follow all that they imply. If he would receive justice, he should himself be just. But perhaps this is only right and not necessary. He may be among the Great Privileged who no longer must do as they are done by.

To the party on the side lines it is sometimes interesting as well as highly enlightening to observe how quickly and thoroughly some people's views change with a variation of circumstances or conditions. The pedestrian who "cusses" every auto driver for his recklessness maligns with equal vehemence the careless person on foot who inadvertently gets in his way, as soon as or at best shortly after, he invests in a "flivver". The rankest of fire eating socialists, Bolsheviks, anarchists, who insists that all real estate is a gift of Providence and should be held in common by all humans becomes a law-abiding citizen with pretty fairly clearcut notions about the rights of property as soon as he purchases, we will say, a house and lot or a small farm.

In the "storekeepers' strike" the miner is receiving a small dose of his own medicine. From his wry face we may reasonably assume that he does not relish the concoction.

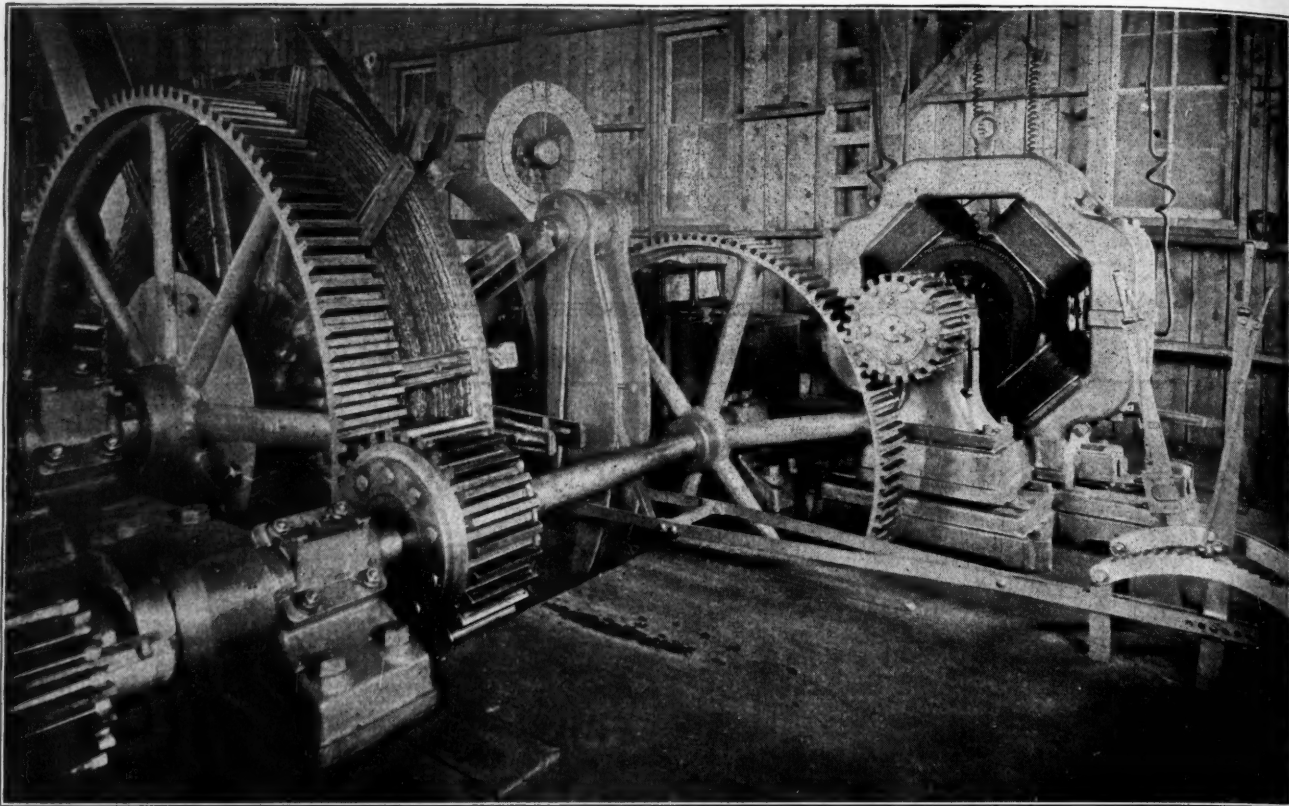


FIG. 1. EARLY ELECTRIC MINE HOIST INSTALLED AT FREE SILVER SHAFT, ASPEN, COLO., IN 1895. AND AT THAT TIME THE LARGEST IN THE WORLD

Progress in the Electrification of Mine Hoists

BY R. S. SAGE
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SYNOPSIS—*The electrification of mine hoists proceeded slowly for many years, chiefly because of their intermittent operation and the high peak loads to which they were subject. The difficulties encountered in their operation have been so successfully overcome, however, that at present over 85 per cent. of new installations are electrically driven.*

AS THE natural occurrence of mineral deposits is usually such as to require their elevation from various depths to the surface, some means of accomplishing this transfer constitutes an important operation at almost all mines. In many cases, particularly with coal, it is possible for the material to be brought out through a tunnel driven either on a horizontal or on such an inclination as to permit the use of cars drawn by mules or electric locomotives. For the most part, however, both with coal and ores, it is necessary to bring the material to the surface by hoisting, either through a vertical shaft or on inclines too steep for the employment of locomotives.

There are therefore so-called "main" hoists for bringing the material to the surface (or as is occasionally the case in metal mines, to lift the material to the main tunnel out of which it is brought in cars), and in many cases auxiliary hoists, generally referred to as "man

and supply" or "chippy" hoists, chiefly used in handling men and materials. Underground, small-powered hoists are often used for hauling cars up steep inclines from one level to another, and less frequently the main hoist itself is installed underground.

Until comparatively recent years the steam engine was used almost exclusively for operating these various mine hoists. Compressed air, however, was also used to a considerable extent, the most notable example of the latter being the group still in operation at the Anaconda Copper Co.'s mines at Butte, Mont. It was many years after electricity had come into general use in the railway field and elsewhere before the utilization of electric motors for driving "main" hoists began to receive serious consideration in this country, although considerable development work had been done in foreign countries, especially in Germany and in the gold fields of South Africa.

Electrification naturally began with the smaller hoists used in underground work, it being early found convenient and advantageous to operate these with electric motors from the direct-current mine circuit supplying lights, pumps, and later electric locomotives, thereby eliminating long steam and air pipe lines. The practice, however, did not extend rapidly beyond these small equipments, for many reasons.

Mine operators, as a rule, were more or less unfamiliar with electric power except in the small quantities supplied by the usual direct-current circuit for the

purposes previously mentioned. Central station power did not reach many mining localities, and where available often could not be had in sufficient quantity at attractive rates or with assurance of reasonable continuity of service. On the other hand, the highly fluctuating character of the mine-hoist load was not such as to appeal to the moderate-capacity central station.

There was also a certain amount of prejudice against the electric drive on the part of the users of steam hoists, due to a feeling of unreliability resulting probably from a knowledge of certain instances of power failure. And further, an idea was prevalent among coal-mine operators that as the coal burned under their steam boilers came from their own mines, the cost of fuel for this purpose was little or nothing and therefore was not taken into account in estimates of the cost of steam power. As a matter of fact, coal that could be used for this purpose had a considerable market value. The exceedingly low all-day efficiency with which the average steam hoist operated and the enormous waste of fuel in supplying power to this and other mining operations was generally unappreciated until made the subject of a special investigation and comparison with results by electrification.

It was therefore necessary that many existing conditions and ideas should undergo a change before hoist electrification became general, headway to this end being slow until the last few years. Much was accomplished by engineering reports of operating conditions at various mining properties which showed in the majority of cases indisputable advantages and economies to be secured by general electrification. As an instance, actual tests of a typical large coal mine hoist indicated that 50 lb. of coal was burned per horsepower-hour of work done on the coal hoisted. With electric power, produced in even a moderate-capacity station, not more than one-tenth this amount of coal would be burned for the same unit of work.

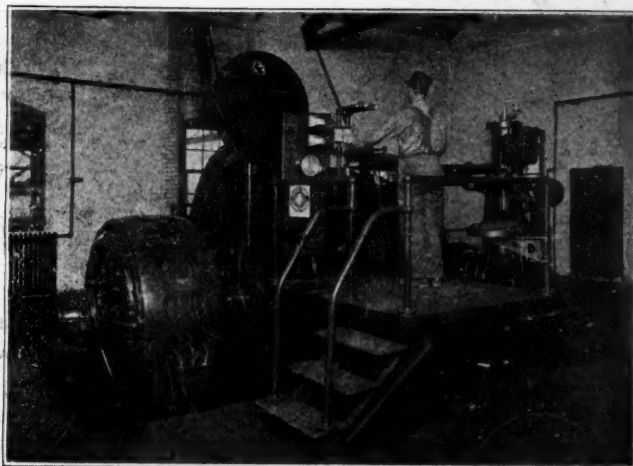


FIG. 2. MAIN HOIST AT PITTSBURGH COAL CO. MONTGOMERY MINE NO. 2, COWDEN, PENN.

As more economical methods of electric power generation and distribution became known and the necessary apparatus became more highly developed, a number of companies carrying on extensive mining operations installed their own hydro-electric or steam-electric plants and instituted motor drive for all their operations, including hoisting. At the same time electric power became more accessible to other mining localities as the number of central generating stations increased and others were enlarged and their service extended.

With such service available, there existed few instances in which electrification could not be shown justifiable from an operating-cost standpoint alone. Meanwhile many hoist electrifications had been made abroad with great success, proving the many claims of superiority for the electric over the steam hoist. Among these were greater safety, reliability, simplicity and economy. An indication of the possibilities in economy accruing

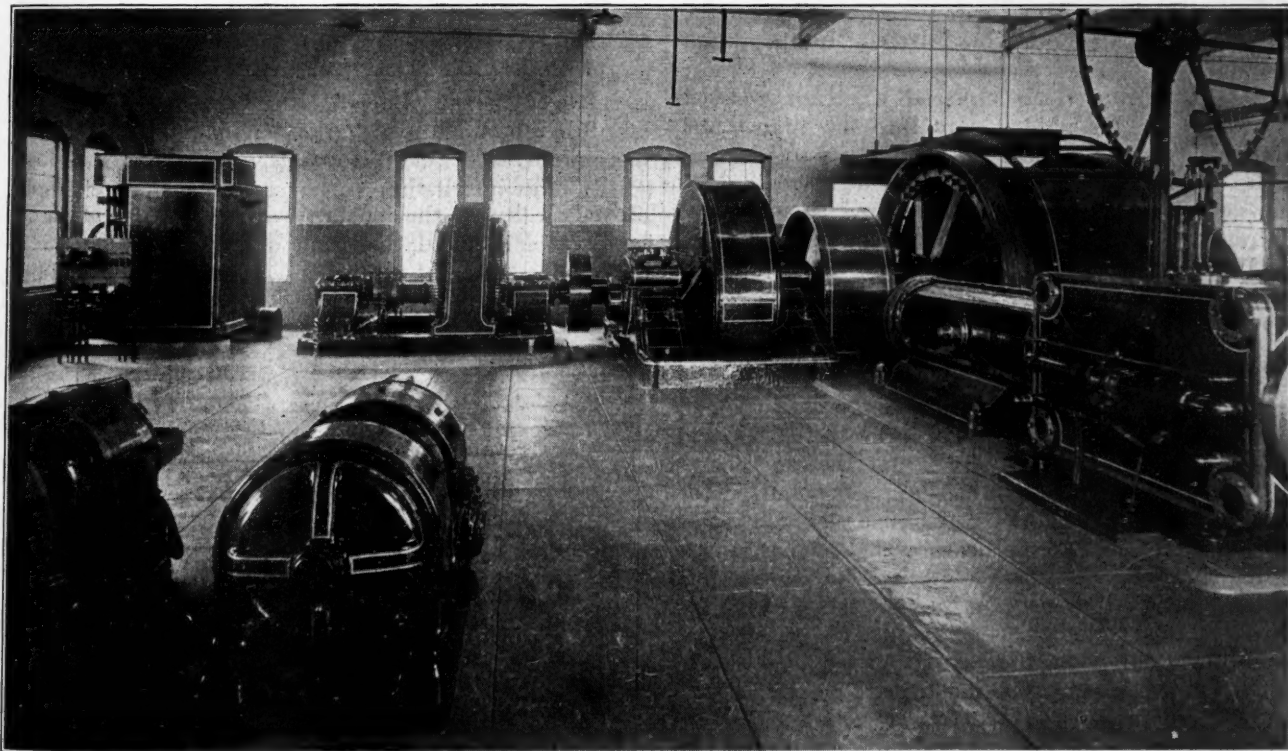


FIG. 3. MOTOR AND GENERATOR EQUIPMENT, TENNESSEE COAL, IRON AND RAILROAD CO., MUSCODO DIVISION, RED ORE MINES, SLOPE NO. 4

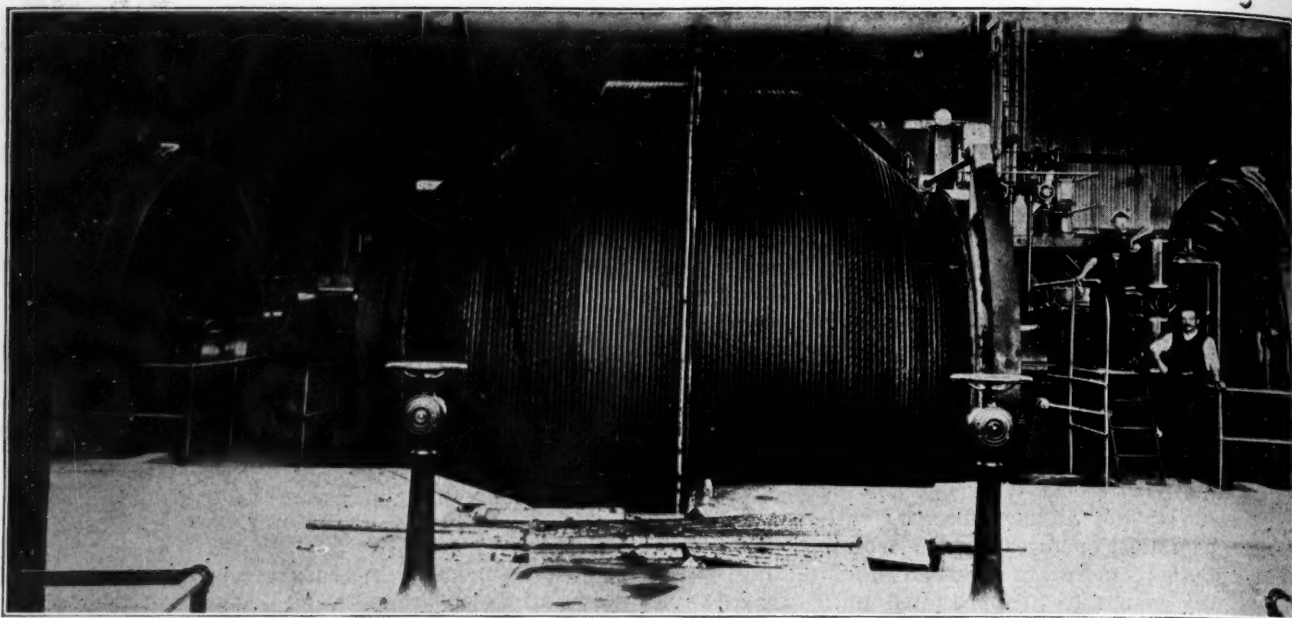


FIG. 4. HOIST AT THE SOUTHLAND SHAFT, CROWN MINES LIMITED, SOUTH AFRICA

from electrification in mining properties is the statement recently made after an investigation, that through complete electrification of the anthracite coal fields the amount of coal used in the production of an annual tonnage of approximately 90,000,000 tons could be reduced from approximately 10,000,000 tons to less than 2,000,000 tons.

Probably the first instance of the application of the electric motor to driving a hoist for mining purposes was the outfit put into operation in July, 1888, at the Aspen Mining and Smelting Co., Aspen, Colo. The manager of the company at that time was persuaded to install 1000 ft. underground a single-drum, flat-friction hoist driven through a single gear reduction by a 10-hp., 440-volt, railway-type motor, the complete outfit being built by the Sprague Electric Railway and Motor Co.

This equipment, which replaced a steam-operated hoist, was used for pulling cars into the tunnel and proved such a success that two similar hoists were installed soon afterward. It continued in operation for many years with the original motor, which has since been replaced by a G-E 800 machine.

In 1895 there was installed at the Free Silver Shaft, also at Aspen, an electrically operated hoist (Fig. 1) of comparatively large capacity, driven through gearing by a 100-kw. railway-type generator. This machine, at that time the largest electrically operated hoist in the world, was designed by D. W. Brunton, mining engineer, and supplied by the Roaring Fork Electric Light and Power Co., a pioneer in hydro-electric power generation. An auxiliary motor of 60 hp. was arranged for throwing in on a second pinion to assist the main motor when necessary to lift the heavy water bailer. Little use, however, has been made of this arrangement.

In the anthracite coal fields the first motor drive for hoist work was installed in 1896 on a 1200-ft. slope at the Maltby Colliery of the Lehigh Valley Coal Co. at West Wyoming, Penn. The hoist, built by the Lidgerwood Manufacturing Co., is driven by a G-E 2000 (approximately 100 hp.), 500-volt, railway-type motor and controlled by an R-15 controller. This machine is in regular operation at the present time, the entire outfit

having been in continuous service during the 22 years since its installation.

From these small beginnings the electric hoist has become today the prevailing type of hoisting machine, many steam plants having been converted to motor drive with great advantage. Fully 85 per cent. of all new installations are now electric motor driven. The General Electric Co. alone has equipped many hundreds of mine hoists of various types in this and foreign countries. Considering only those driven by motors having a continuous rating of 250 hp. or larger, there are 240 installations aggregating 121,000 hp. A typical coal mine installation is illustrated in Fig. 2. Of these all but 35 are driven by geared induction motors, the largest being of 1800 hp. continuous capacity, developing during starting approximately 2700 hp. This equipment (Fig. 3) the largest of this type in this country, is installed at the mines of the Tennessee Coal, Iron and R.R. Co. at Muscoda, Ala., having replaced a first-motion Corliss engine for operating a single drum slope hoist. This installation, furnishes an excellent example of the ability of the modern central power station to handle widely fluctuating loads of this character.

The direct-current equipments include two of 4000-hp.

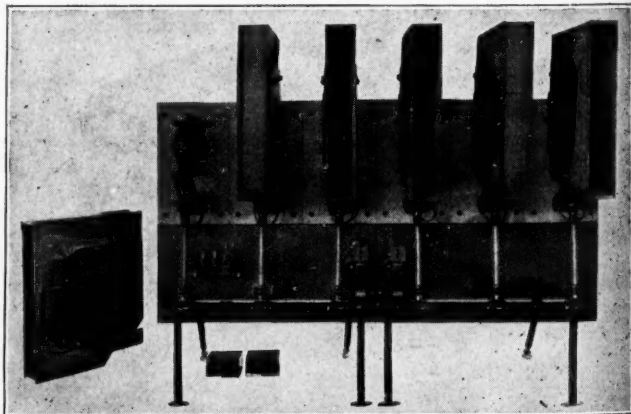


FIG. 5. PANEL SHOWING AIR BREAK CONTACTORS WITH POTENTIAL INTERLOCKING CONTACTOR AND TRANSFORMER

continuous rated capacity, the largest in the world (Fig. 4), which are installed at the plants of the Crown Mines, Ltd., and the New Modderfonte Gold Mining Co., both in South Africa.

An electrification of unusual magnitude indicating the extent to which electric drive for mine hoists has been carried is that of the Cleveland Cliffs Iron Mining Co., Ishpeming, Mich. This company, which was among the earliest to adopt electric power in mining operations, produces its own current in both hydro-electric and steam plants, and has installed some 29 electric hoists totaling over 11,000 hp. rated capacity. Of these hoists, 26 are driven by geared induction motors, 16 of which, identical in every way as to electric equipment, are of 400-hp. capacity at 360 r.p.m., 2200 volts. These installations have been made from time to time as new shafts were opened, the hoists being used with complete

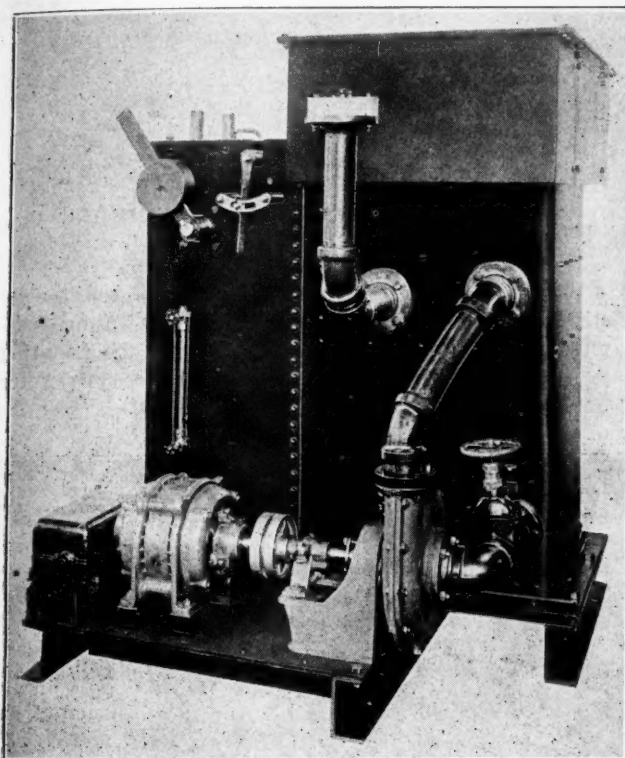


FIG. 6. LIQUID RHEOSAT WITH ADJUSTABLE SILL FOR INDUCTION HOIST MOTOR

success for handling ore and men, and during sinking operations.

There are many similar examples of extensive hoist electrification in both the metal and coal-mining fields, and the number is continually being augmented as circumstances permit.

The broad experience gained in the past has led to many improvements in the design of the apparatus constituting complete equipments. This experience, backed by a thorough understanding of the various elements upon which the successful operation of the electric hoist depends, insures in every specific case the application of apparatus of the proper type and capacity required to meet the conditions of operation. In general, every case constitutes a problem in itself, necessitating for its solution not only a complete knowledge of the duty to be performed, but all other conditions affecting the design of apparatus and system to be employed.

With induction motors, widely used in mine service,

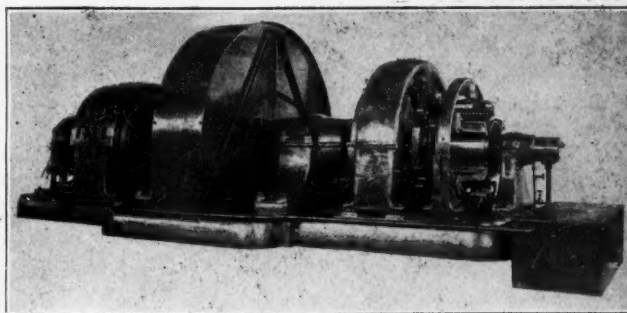


FIG. 7. FLYWHEEL MOTOR-GENERATOR SET

the principal requisite in addition to adequate torque and capacity, good performance characteristics, and rugged construction, is low slip-ring voltage in order to prevent flash-over at the rings in case the motor is reversed at full speed. Under this condition double standstill voltage is developed between the collectors, and should a short-circuit occur the motor would be incapable of developing appreciable torque.

The highly developed art of gear-cutting permits the use of moderately high-speed motors, which is desirable from the standpoint of first cost as well as performance characteristics. With herringbone gears it is not uncommon to use reduction ratios as high as 15 to 1.

As large direct-current motors can be designed to operate with good efficiencies at the low speeds required, they are usually direct-connected to the hoist drums and the necessity for gears eliminated. The use of commutating poles and compensating pole face windings for hoist motors and Ward Leonard generators has overcome all difficulty in handling the heavy peak loads encountered in this service.

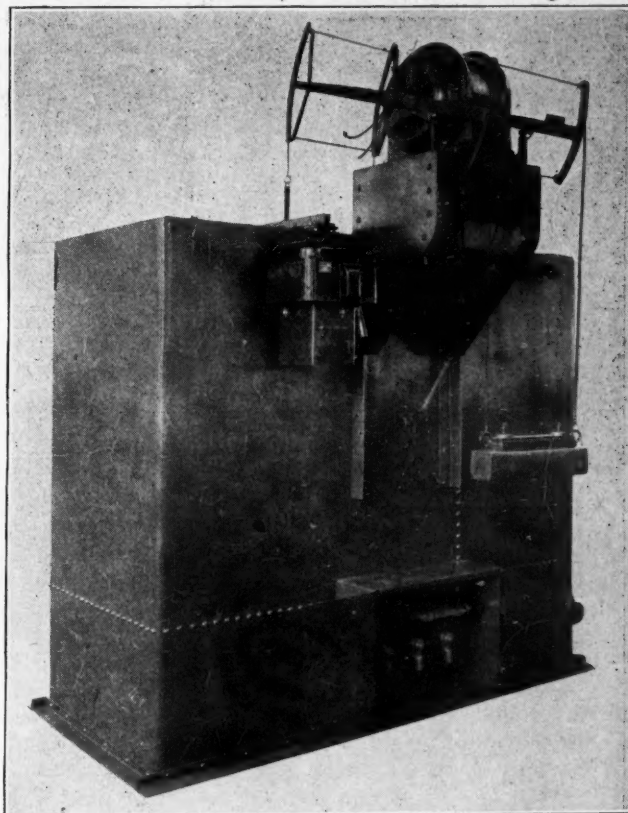


FIG. 8. LIQUID SLIP REGULATOR FOR FLYWHEEL INDUCTION MOTOR-GENERATOR SET

(Shows mounting of oil switch for short-circuiting torque motor)

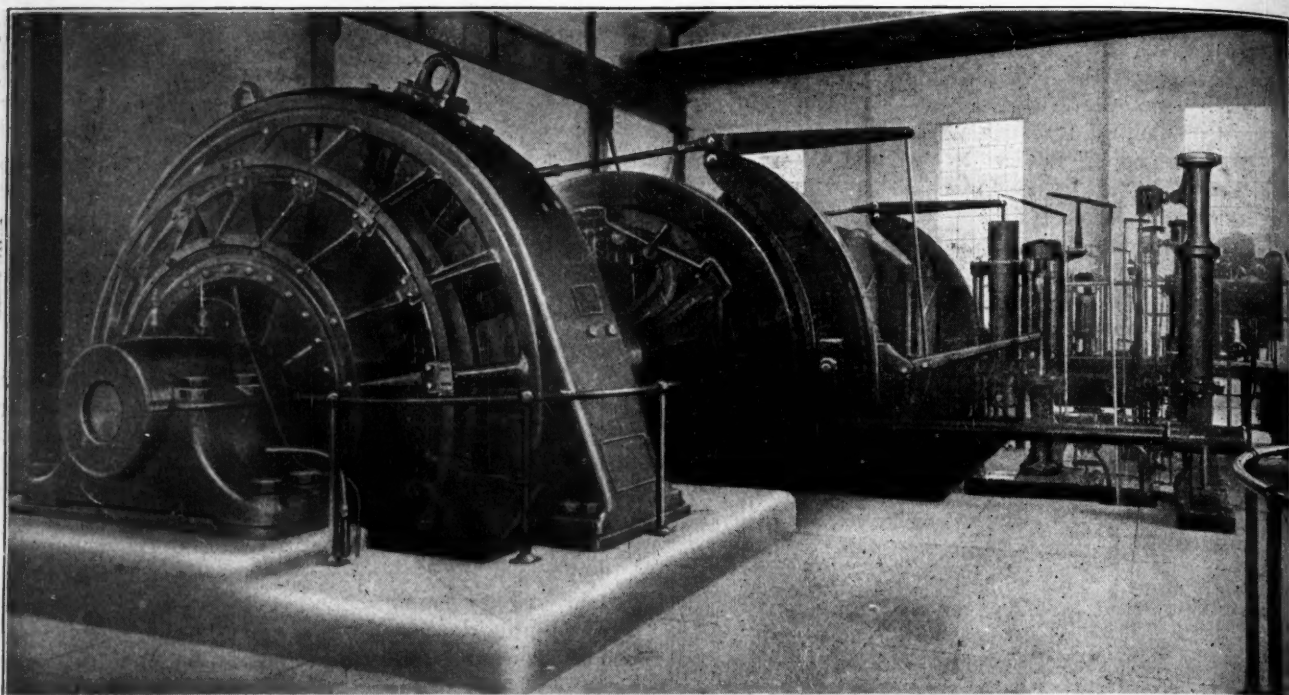


FIG. 9. HOIST MOTOR DRIVING FIRST MOTION DOUBLE CYLINDRICAL HOIST, ELM ORLU MINING CO., BUTTE, MONT.

Difficulty was early encountered in some instances because of insufficient capacity in the resistances used with rheostatically controlled motors. Due to the frequency of starting and the necessity of operating at creeping speeds for shaft and rope inspection, etc., and

the liability of occasional reversal at full speed, the resistance for the mine hoist motor must be specially designed with these requirements in view, the resulting rheostat being much heavier than that required for occasional starting duty, or for crane service. For the

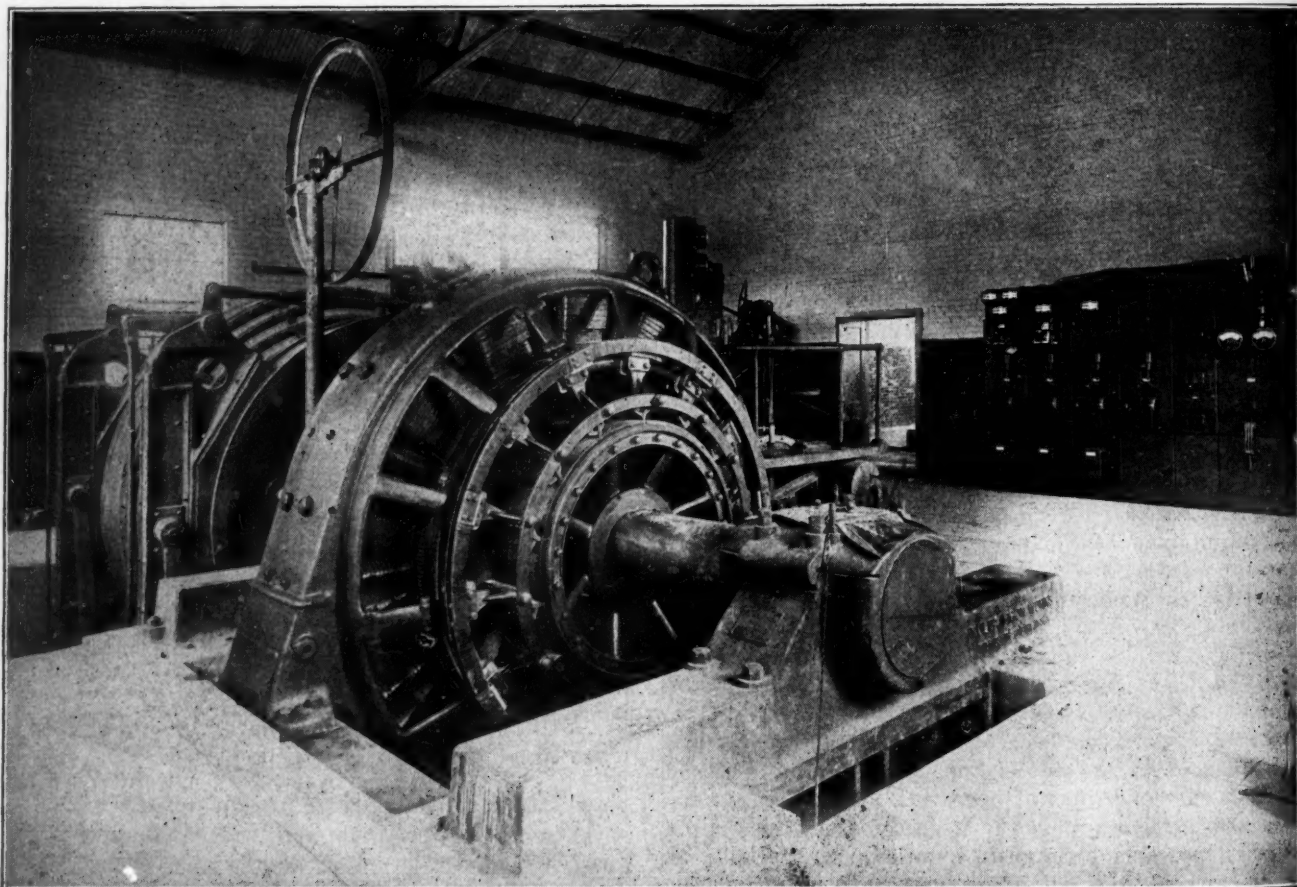


FIG. 9. HOIST MOTOR DRIVING FIRST MOTION DOUBLE CYLINDRICAL HOIST, CONSOLIDATION COAL CO., FAIRMONT, W. VA.; DUPLICATE EQUIPMENT AT MINE No. 87

same reasons the controller must provide, in addition to the steps required for properly accelerating the hoist, a suitable number of points for speed regulation.

Experience indicates that with few exceptions motors of 100-hp. capacity or larger for mine-hoist service cannot be successfully handled by drum controllers because of the magnitude of the currents and the frequency with which the circuits must be made and broken. These requirements have been met successfully, by the use of magnetically operated switches (so-called contactors) for both the primary and secondary circuits. With this type of control the motor currents can be interrupted as frequently as necessary with only an occasional renewal of tips, and the operator's controller need be only large enough to handle the small current required for operating the contactors. At the same time, automatic acceleration of the motor is attained, thereby protecting it from abuse and the power supply from excessive current demands.

Because of advantages in transmission, wiring, etc.,

separate resistance sections, whereby a high initial resistance is provided for slow-speed running at light loads and a low final resistance for operation at full speed. Rheostats of this design were supplied in considerable numbers for the replacement of those of foreign manufacture in the South African mines, and have been widely applied to hoists in this country, the largest being used in connection with an 1800-hp. induction hoist motor.

While the large majority of electric hoists in this country are driven by induction motors, the extremeness of control and high degree of safety of operation obtained with direct-current motors operating on the Ward Leonard system commends its use for high-speed shaft hoists.

It is often impossible for the power-supply system to operate under the heavy peak loads imposed by large hoists without seriously affecting the voltage regulation and interfering with the operation of other apparatus supplied from the same station. In such cases some

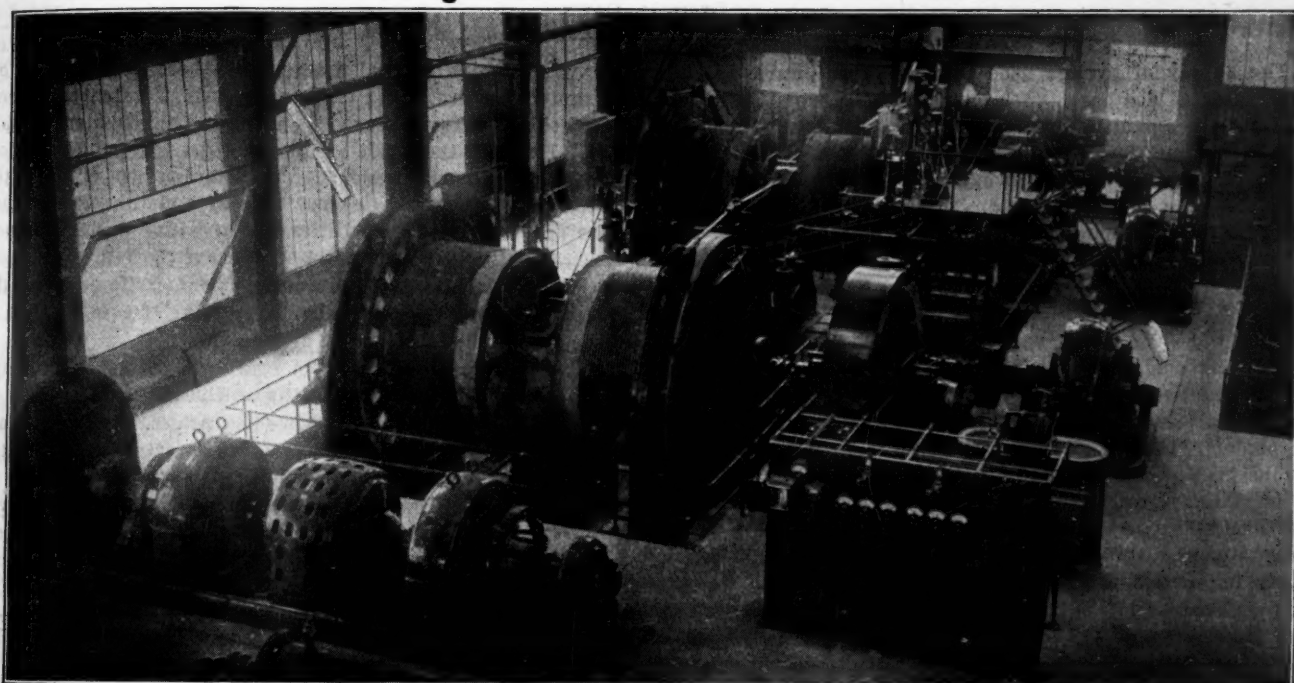


FIG. 11. AUTOMATIC MAIN HOISTS, INSPIRATION CONSOLIDATED COPPER CO., MIAMI, ARIZ.

it became desirable to use primary potentials of 2200 volts for induction motors for hoist service, especially in medium and large capacities. This necessitated the development of contactors for interrupting the currents in air for reversing the primary connections of the motor, as practice had demonstrated the unsuitability in this service of switches breaking currents under oil. This type of contactor has been built in large numbers and has been successfully applied to hoist motors up to and including 1800 hp. continuous capacity at 2200 volts.

Although for most induction motor-driven hoists of less than 500-hp. capacity, control using contactors and grid resistance providing not less than eight balanced and properly graduated steps for both directions of rotation have proved entirely successful, it has been found desirable for larger motors, and to a lesser extent for smaller sizes, to use a rheostat utilizing a liquid as the resistance medium. A design was developed that has met all the requirements of successful operation. The chief feature of this rheostat is the use of two

form of load-equalizing equipment is necessary, whereby the extremely fluctuating hoist load may come on the supply lines as a more uniform demand. This is commonly effected by combining with the Ward Leonard power set a flywheel and regulating device to permit the wheel to supply all energy required by the hoist above the average value over the complete cycle.

There are numerous installations using this system both in this country and abroad, among the more recent being the 1800-hp. equipment at the Elm Orlu Mining Co. at Butte, Mont., and the duplicate 1400-hp. coal hoists at the Consolidation Coal Co., Fairmont, W. Va. Flywheels built up of rolled steel plates permitting of high stresses and consequently of high peripheral speeds can usually be made much lighter than cast wheels. Wheels of laminated steel plates up to 50 tons weight have been built for this service.

Important improvements have been made recently in the automatic regulating device used in connection with the flywheel equalizing equipments previously mentioned.

In all forms of this device, commonly called a liquid slip regulator, use is made of tiles or earthenware cylinders for separating the electrodes. Difficulty has been experienced from leakage and frequent breakage of these barriers. With the newest type the design is greatly simplified and both of these troubles have been eliminated.

The matter of safety in the operation of mine hoists has received much attention. Electrical power is pre-eminently suited to the application of safety methods. Devices may be simply applied for protection against overwinding and various other emergency conditions which may develop in the electrical equipment itself or in the system as a whole. As electrical braking is available, the mechanical brakes are relieved of much use and consequent wear and tear, their use on hoists operating with Ward Leonard control being confined almost

entirely to holding the loads. With this system, loads of any value can be lowered at any partial speed and brought to rest without resorting to the mechanical brakes. The power developed by the descending load may be returned in part to the power system.

The degree of safety and accuracy of control which may be secured in the operation of direct-current mine hoists is well exemplified in the installation at the Inspiration Copper Co., Miami, Ariz., of two automatic main hoists which operate entirely without regular attention from an operator. In these two hoists, which have been in successful operation since 1915 and have a combined capacity of 1000 tons per hour from a depth of 630 ft. the loading, starting, dumping and stopping are all accomplished automatically, although by the simple throw of a lever switch the equipment can be instantly put under manual control.

Commercial Recovery of Pyrite from Coal*

By S. H. DAVIS,
Baxter Springs, Kansas.

The supply of pyrites used in making sulphuric acid in the United States has been largely imported from Spain and Canada, the Spanish imports amounting to nearly 1,000,000 tons per annum in the pre-war period. The greatly increased use of sulphuric acid and the cutting off of these Spanish imports, incident to war conditions, brought a threatened shortage of sulphur supplies during the war period.

The bituminous coal mines of certain districts have, for many years, furnished a small tonnage of pyrite in the form of coal brasses. A mechanical concentrator at Danville, Ill., for a number of years, has been treating hand-picked lump pyrite and coal from the picking belt and from the mines, and a small plant near Gillespie, Ill., for a few months has been recovering pyrite from washery refuse. Many mines throughout Illinois, Indiana, Western Kentucky, Ohio and Pennsylvania have shipped an occasional car of the hand-cleaned lump pyrite. However, a very small percentage of the available pyrite has been recovered in this way, as the miners usually throw such lumps into the gob with slate and other impurities. It has been estimated that the western Indiana coal field could furnish more than 100,000 tons of pyrite per annum. The present production is very small. The possibility of furnishing the domestic trade with pyrites recovered as a byproduct from coal-mining operations appears attractive but there are certain features difficult to overcome.

Pyrite, to be used in acid making, must meet with certain requirements as to size and purity. Lump for grate burners should be under 3 in. and over 1 in. in diameter. Fine for use in mechanical roasters should be under quarter mesh. The material should be high in sulphur, free from arsenic and phosphorus, and as low in carbon as possible. The pyrite obtained from coal can be made to meet all the above requirements, but it is difficult to remove all the carbon. The pyrite in coal occurs as bands and nodules of varying thickness and size and of comparative purity, but mixed with this is more or less web sulphur. The web sulphur carries with it admixed coal, which may make the concentrate run up to several per cent carbon. This makes the concentrates subject to firing, causes heavy consumption of niter, and lowers the acid-plant capacity, owing to a dilution of the gases. The hand-cleaning methods and the present plants have failed to entirely overcome this difficulty, hence it may be necessary at the acid plant to mix this coal pyrite with other ore.

A large tonnage of pyrite is annually being thrown into

the waste areas of coal mines, but there seems little opportunity to correct that unfortunate loss of valuable mineral as there are many difficulties in making this material available. Hoisting the crude pyrite from the coal mines in most instances seriously handicaps coal-mining operations; the chutes and screens are injured thereby and this fact necessitates separate loading facilities. In treating washery refuse, no serious difficulties are encountered, but there are few washeries at which the refuse contains sufficient pyrite or where the refuse is in large enough quantity to make the preparation of its pyrite content for market attractive.

The recovery of pyrite from coal will not meet with any great expansion, it is felt, so long as the Louisiana brimstone can be obtained at present or pre-war prices. The acid plant that uses pyrite must have a greater investment in burning and dust-settling equipment than were brimstone is used. It is true, however, that in certain locations farthest removed from the source of supply of brimstone and near the coal fields coal pyrite can be advantageously used.

Minecdotes

Was He a Hebrew?

In the lower anthracite coal region where the seams are thickest and pitch at a very steep angle, it is nothing unusual for a miner after firing a blast to find the chutes and the manways leading to the face of his chamber blocked with coal, being unable to reach the face of his chamber until hundreds of tons have been loaded out.

It was in one of these places not so long ago that a miner was shut off from his fellow workmen while he was in the act of trying to dislodge a shot that had been too deeply laid. The coal at the face began to run and before he had time to reach a place of safety he was carried down the chute together with hundreds of tons of coal.

Through a miracle he was not badly injured but found himself entombed behind a mass of coal.

After a large force of men had been working four days trying to rescue him, the first thing he said when they found him was:

"Say, fellers, you put my tickets on them cars you load."

*Article presented at the Chicago Meeting of the American Institute of Mining and Metallurgical Engineers, September, 1919.

Mine Accidents: English Speaking vs. Non-English Speaking Employees.*

By ALBERT H. FAY

U. S. Bureau of Mines

THE employment of non-English-speaking labor in American mines has been brought about by reason of the rapid expansion of the mining industry, beginning in the early 80's. The Americanization of this great body of labor, and its relation to accidents in the mining industry, are two problems of prime importance—the first as affecting citizenship and the growth of this republic, and the second as an economic problem in mining costs. The former exerts an influence upon the latter, for the former implies education, social welfare, civic pride and a general uplift to the ideals that America stands for. Ignorance, dirty and filthy living conditions, ill-health, disregard for law and order, discontent and lack of civic interest, lead to indifference and carelessness, which are perhaps the greatest of all accident causes.

numbers. They were followed within a year or two by a few Magyars, and the number of immigrants of this race gradually increased each year. The Polish immigration began about 1890, although individual members of the race had been coming for a period of nine or ten years. After the year 1890 Poles and Slovaks arrived in great numbers. A few Italians were employed before the year 1895, but the immigration of this race did not begin upon a large scale until about 1900. They were at first engaged in railroad construction and maintenance-of-way work and gradually drifted into the mines. Croatians were employed in some sections before 1890, and Servians began to arrive in small numbers in the early nineties.

The great bulk of all the immigration from southern and

TABLE I

FOREIGN-BORN MINE EMPLOYEES BY NATIONALITIES, SHOWING AGRICULTURAL AND MINING EXPERIENCE PRIOR TO ENTERING THE UNITED STATES.

Nationality	United States		Pennsylvania Bituminous		Ohio-Ind.-Ill.		Kans.-Okla.		West Virginia		Mich. Copper		Lake District Iron	
	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.	Number	Per Cent.
		Mines		Mines		Mines		Mines		Mines		Mines		Mines
Bohemian and Moravian...	408	57.6	188	41.0	196	72.4	...	...	115	2.6	...	...	...	...
Bulgarian	158	9.5	...	...	...	...	...	...	...	...	...	...	...	...
Canadian (Fr.) .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Croatian	1,212	3.6	804	3.4	155	7.1	...	...	242	2.5	...	...	247	6.1
English	1,277	82.6	525	78.5	547	87.8	129	87.6	...	...	...	...	147	53.7
Finnish .....	...	...	...	...	...	...	...	...	...	...	1,408	2.7	916	0.4
French	352	72.2	181	56.9	...	...	144	90.3	...	...	...	...	...	...
German	1,423	55.0	663	49.9	575	59.7	114	65.8	...	...	84	13.1	...	...
Irish	321	59.2	169	53.8	...	...	...	...	...	...	...	...	...	...
Italian, North	4,840	13.7	2,083	5.3	1,551	22.8	853	21.6	353	3.7	515	5.2	600	14.7
Italian, South	2,883	7.7	1,131	4.8	361	23.3	319	9.4	1,072	5.1	...	...	223	9.4
Lithuanian	1,570	4.3	398	4.5	1,023	3.6	109	11.0	...	...	...	...	...	...
Magyar	2,423	10.9	1,472	9.2	581	17.7	...	...	322	5.0	108	5.6	...	...
Mexican	98	71.4	...	...	...	...	98	71.4	...	...	...	...	...	...
Montenegrin	118	4.2	...	...	...	...	...	...	...	...	...	...	...	...
Polish	3,771	9.8	2,578	7.2	741	14.2	175	33.1	277	7.2	...	...	383	9.4
Roumanian	97	7.2	...	...	...	...	...	...	...	...	...	...	...	...
Russian	1,389	7.8	890	7.3	344	7.3	88	13.6	...	...	...	...	...	...
Ruthenian	151	15.9	130	13.8	...	...	...	...	...	...	...	...	...	...
Scotch	561	88.2	187	84.5	237	92.4	90	87.8	...	...	...	...	164	5.5
Slovak	5,378	10.7	4,237	8.7	684	15.1	122	54.1	335	10.4	...	...	321	3.7
Slovenian	1,248	20.0	1,013	14.4	86	34.8	99	53.5	...	...	142	5.6	154	10.4
Swedish	142	15.5	...	...	...	...	...	...	...	...	104	18.3	...	...
Welsh	178	87.6	...	...	92	91.3	...	...	...	...	...	...	...	...
	*31,325	20.7	*17,246	14.4	7,173	30.5	2,340	43.0	2,716	10.4	3,781	14.6	3,155	8.5

*The above figures include only races with 100 or more miners reporting. The totals are for all foreign-born.

NOTE—Compiled from "Immigrants in Industries," a report of the Immigration Commission, 1911. Senate Document No. 663, Sixty-first Congress, Second Session. Vols. 6, 7 and 16.

During the decade previous to 1880 (as well as in earlier years) the greater part of the employees in the coal and metal mines were Americans or representatives of the English, Scotch, Welsh, German and Irish races. The majority of the men of foreign birth had been in this country for some years previous to the great expansion of the mining industry which began about this time. English-speaking miners continued to immigrate and to find employment in the mines in large numbers until about 1890. Since that year comparatively few immigrants from Germany and Great Britain have entered this industry, although Swedes and other Scandinavians have been constantly employed since the early eighties.

The employment, in the mining industry, of immigrants from southern and eastern Europe began about 1880. The Slovaks were the first arrivals and immigrated in considerable

eastern Europe, however, has occurred within the past 13 years. Russians, Bulgarians, Roumanians, Ruthenians, Syrians, Armenians, Macedonians, Croatians, Servians, as well as Poles, Magyars, Slovaks and Italians, have been among the recent arrivals.

The races of southern and eastern Europe have continued, up to the time of the war, to find employment in the mines in increasing numbers in almost every important mining district in the eastern states and the Lakes district. Many of these recent immigrants have found their way to the central and western states. As a result of the rapid expansion of the mining industry, many mining communities have been founded, the population of which are largely made up of immigrants who have arrived during recent years.

The pioneer American, English, Irish, German, Scotch and Welsh miners are thus outnumbered and their positions filled by the more recent immigrants. It is not difficult to account for this racial change which is still going on. The former

*Paper presented before the eighth annual safety congress of the National Safety Council, Cleveland, Ohio, Oct. 1 to 4, 1919.

operatives and their descendants had opportunities to secure more congenial and safer work in other industries. Many of them advanced in the industrial scale, becoming foremen and attaining other responsible positions. A large number have abandoned the occupation of miner for positions as day or shift men. Many also migrated and located in the Middle West and Western States.

Many of the former miners who left the industry entirely

TABLE II
PERCENTAGE OF EMPLOYEES BY OCCUPATION AND
ENGLISH SPEAKING AND NON-ENGLISH
SPEAKING RACES.*

OCCUPATIONS	Americans and western Europeans		Southeastern Europeans	
	Num ber	Per cent	Num ber	Per cent
Superintendents	10	.78	.....	.....
Foremen	14	1.10	.....	.....
Bosses	76	5.96	6	.28
Inspectors	10	.78	15	.70
Engineers and motormen	50	3.92	12	.56
Firemen	29	2.27	10	.47
Electricians and helpers	12	.94	7	.33
Blacksmiths and machinists	33	2.59	13	.61
Carpenters and Masons	46	3.61	9	.42
Track and roadmen	64	5.02	21	.97
Car runners, droppers, etc.	47	3.69	49	2.28
Drivers and teamsters	124	9.73	67	3.12
Machine runners and helpers	75	5.88	148	6.90
Pick miners	428	33.57	1,107	51.61
Loaders and scrapers	45	3.53	379	17.67
Trappers	16	1.26	20	.93
Pipe and pumpmen	20	1.57	7	.33
Laborers	176	13.80	271	12.82
Total	1,275	100.00	2,141	100.00

*Represents ten typical bituminous coal mining companies of Pennsylvania.

because of change in mining methods or the employment of immigrants, entered mercantile, clerical, mechanical and more "pleasant" work of other kinds. Many of the business and professional men in the mining towns were formerly mine workers. Their places were filled without difficulty with recent immigrants who were content with the wages and work-

through the refusal of their children to enter the industry and the attitude of the parents themselves, who frequently discourage it. Of the total native-born, of fathers who were miners, a large percentage enter occupations other than mining.

The conclusion from the limited data at hand, therefore, seems to be that while the foreign-born males of more than 16 years of age, whenever employed, work in the mines, the persons native-born of native father, together with the second-generation immigrants, are entering the mines only to a limited extent. This inference bears out in a large measure the experience of the mine operators, who state that the native-born and the second-generation immigrants are not entering the mines in the same numbers as formerly and that the industry is receiving a constantly decreasing number of employees of these classes.

There exists a prejudice against recent immigrants, which also operates to an important extent in the displacement of former employees. Many Americans, English, Germans, Scotch, Irish and Welsh did not and do not desire to be associated in the mines with the recent immigrant, and the feeling has become prevalent that a sort of reproach attaches to an intimate working relation with the foreigner. The races of former immigrants have, therefore, left the industry and have entered other work, which they feel is more dignified and congenial.

The relatively small number of American miners who remain in the industry must work side by side with the recent immigrant. To a greater or less degree the standard of safety in the mine is set by the demands of the ignorant and inexperienced immigrant, not by the more intelligent American, and the standard of life is decided by those conditions which will be accepted by the same recent arrival. In short, in order to work in the coal-mining industry, the American must compete with the recent immigrant, who, as a rule, is not very particular as to living and working conditions. These condi-

TABLE III
NUMBER OF EMPLOYEES IN BITUMINOUS COAL MINES AND METAL MINES BY NATIONALITY, SHOWING PERCENTAGE WHO CAN SPEAK ENGLISH.

Nationality	BITUMINOUS COAL MINERS								METAL MINES							
	Pennsylvania		West Virginia		Ohio, Ind. Ill.		Kans Okla.		Copper Michigan		Iron Minnesota		Iron Alabama		Iron Michigan	
	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English	Number Employed	Per Cent Speaking English
Bohemian and Moravian	451	69.4	.....	.....	247	77.3	.....	.....	291	95.5	.....	.....	.....	.....	40	100.0
Canadian (Fr.) .....	.....	.....	.....	.....	.....	.....	.....	.....	484	44.0	178	70.8	.....	.....	158	32.1
Croatian	1,945	54.2	255	71.0	180	78.9	.....	.....	1,498	37.9	405	76.3	.....	.....	661	60.5
Finnish .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
French	328	71.6	.....	.....	190	68.4	206	74.3	.....	.....	.....	.....	.....	.....	.....	.....
German	1,511	91.0	110	90.0	841	89.4	177	91.0	113	100.0	.....	.....	.....	.....	.....	.....
Italian, North	3,323	58.8	391	65.5	1,685	68.0	1,129	62.4	533	58.0	134	57.5	.....	.....	541	45.3
Italian, South	2,197	60.3	1,157	63.9	416	50.2	418	66.0	56	62.5	77	50.6	121	61.2	54	48.1
Lithuanian	630	71.1	419	24.7	1,080	75.9	119	88.2	40	22.5	.....	.....	.....	.....	.....	.....
Magyar	3,489	50.8	337	63.5	596	50.0	48	75.0	79	13.9	.....	.....	.....	.....	.....	.....
Montenegrin .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	47.8	.....	.....	.....	.....	.....
Norwegian .....	.....	.....	.....	.....	.....	.....	.....	.....	41	97.6	.....	.....	.....	.....	.....	.....
Polish	5,900	50.3	294	65.0	787	57.3	209	65.1	65	69.2	86	73.3	.....	.....	393	51.1
Russian	1,265	56.9	73	68.5	371	67.9	101	70.3	.....	.....	.....	.....	.....	.....	.....	.....
Slovak	9,853	57.1	382	63.1	778	73.5	124	65.3	.....	52	76.9	.....	.....	.....	127	81.9
Slovenian	1,534	59.6	51	54.9	94	72.3	185	68.1	157	65.0	298	79.5	.....	.....	65	50.8
Swedish	216	97.2	.....	.....	67	92.5	.....	.....	104	80.8	.....	.....	.....	.....	160	89.4
Total	32,642	58.2	3,091	63.6	7,332	69.7	2,716	69.1	3,461	52.7	1,276	70.5	121	61.2	2,199	57.3

NOTE—Compiled from "Immigrants in Industries," a report of the Immigration Commission, 1911. Senate Document No. 663, Sixty-first Congress, Second Session. Vols. 6, 7 and 16.

ing conditions which prevailed at the mines. The wages paid in American mines are highly attractive to the recent arrivals of agricultural laborers from southern Europe.

FAILURE OF NATIVE-BORN TO ENTER THE INDUSTRY

Another noteworthy tendency is seen in the fact that the racial displacement has occurred not only through the departure from the industry of the former employees, but also

tions, however, are in most cases far better than in factory towns where congestion prevails.

Another effect of recent immigration from central and southern Europe has been the preventing of the English, Irish, Scotch and German immigrant entering the mining industry. As already noted, these western European races were coming to the industry in large numbers prior to the early 80's, but began to decline toward the end of the decade and practically

stopped about 1893 or 1894. There can be no question but the immigration of the Slovaks, Poles, Magyars and other races operated to prevent the further coming of these older immigrants to the industry, precisely as it operated to drive out of the industry those already employed, together with the native Americans. There is therefore no incentive for the English or German miner to migrate to the mining regions and compete with the Slovaks, Croatians, Italians, etc.

CITIZENSHIP

A point of general interest is the tendency on the part of the different races of foreign birth working in the mining industry to acquire citizenship, and their general interest in public and civic affairs. The recent immigrant manifests little real or intelligent civic interest. This may be ascribed to his ignorance of our political methods, his inability to read or speak English, the social and political aloofness of these races in the more or less remote mining villages, and their desire to avoid taxation.

Those who reside in or near the cities seem to exhibit more interest than do those of the isolated communities. It seems that the Bohemians and Moravians, 94 per cent. of whom can read some language, take a much more active part in civic affairs than any other race of recent immigration in the bituminous districts of Pennsylvania. Among the other Slavic races, the Slovaks (82 per cent. read) and Poles (77 per cent. read) lead in this regard, while the Croatians (87 per cent. read) make the poorest showing. It is almost the universal statement that this latter race shows but little civic interest, and that only few become naturalized.

The Italians (81 per cent. read) both North and South, are more active than the Slavic races in their efforts to become citizens, and appear to take a more active part in civic affairs. In cases where there seems to be encouraging civic activity it is nearly always due, not to their own intelligent efforts to attain citizenship and exercise its privilege, but to the influence of interested politicians, who in many cases may be a leader of their own race; for example, an intelligent banker and steamship ticket agent. It seems true of all the later immigrating races that they take far less interest in civic affairs than did the German (97 per cent. read) and English (98.5 per cent. read) immigrants.

The foreigner should be taught that the laws of America were made to protect, and not harass, every good citizen, rich and poor alike, and it is the duty of well-informed Americans to make this understood. If well-meaning foreigners, the making of good citizens, are left entirely to their own devices, they fall an easy prey to the designing I. W. W. and the Bolsheviks. Somebody who understands their language fully, and in whom they have confidence, should explain to them that they are being deceived so long as they listen to anti-American propaganda.

RELIGIOUS ORGANIZATIONS AND THE IMMIGRANT

The association between the native Americans and the southern and eastern European immigrants is limited. The general attitude of many members of the native churches toward the immigrants is one of indifference and there is a strong inclination in many communities to shun association with the immigrant in religious activities. In many cases where missionary efforts are made, religious services for the immigrants are frequently held in barns, stores or other unattractive places, thereby lessening the interest in them. The races from the southern European countries, which compose a large portion of the mining population, have been reared where there is no social caste in religious organizations, and have worshiped in buildings which are unsurpassed in beauty and grandeur. When these people are offered services held in stores, barns and similar buildings, their interest in the services naturally is small and they become indifferent. Lack of

interest in religious affairs tends to decrease activities in civic affairs. The various organizations can be important agents in teaching these immigrants the rudiments of the English language and pointing out to them their duties as American citizens.

LACK OF MINING EXPERIENCE ON THE PART OF RECENT IMMIGRANTS

Men of the races of the old immigration (western Europe) have been employed in the mines of the United States for many years. As a result of their experience both in this country and abroad, they are far better qualified as miners than are the southern and southeastern Europeans. The older immigrants

TABLE IV
PERCENTAGE OF EMPLOYEES WHO READ, BY GENERAL NATIVITY AND RACE.

General Nativity and Race	Michigan Copper Mines		Michigan Iron Mine		Oil Refining	
	Number	Per Cent. who read	Number	Per Cent. who read	Number	Per Cent. who read
Native-born of native father:						
White	145	99.3	51	100.0	37	100.0
Native-born, of foreign father, by country of birth of father:						
England (Includes Canada)	486	98.5	56	100.0		
Finland	64	100.0				
Germany	188	99.5				
Ireland	78	98.7			113	100.0
Slovak					31	100.0
Sweden			46	100.0		
Foreign-born, by race:						
Canadian, French	291	75.3	44	86.4		
Canadian, Other	77	98.7				
Croatian	485	82.3	156	98.1		
English	820	98.7	135	99.3		
Finnish	1,509	99.5	656	98.8		
German	114	99.1				
Irish	40	87.5			108	95.4
Italian, North	537	94.4	529	94.7		
Italian, South	57	89.5	54	90.7	182	88.4
Lithuanian					62	88.7
Magyar	81	92.6				
Norwegian	41	100.0				
Polish	65	90.8	385	85.2	221	90.0
Ruthenian					90	72.2
Slovak			123	88.6	130	88.5
Slovenian	156	98.7	70	98.6		
Swedish	105	98.1	160	100.0		
Grand total *	5,557	95.4	2,800	94.9	1,116	84.2
Total native-born of foreign father.	927	99.0	215	99.5	214	100.0
Total native-born	1,072	99.1	268	99.6	251	100.0
Total foreign-born	4,485	94.5	2,532	94.4	865	79.7

*This table includes only races with 40 or more males reporting. The totals, however, are for all races.

NOTE—Compiled from "Immigrants in Industries," a report of the Immigration Commission, 1911. Senate Document No. 663, Sixty-first Congress, Second Session, Vols. 6, 7 and 16.

speak English either as their native tongue, or, as in the case of the Germans and Scandinavians, because of long residence in this country. They may be treated in almost every respect upon the same basis as the American miners.

The members of the races of the recent immigration, on the other hand, have been in the United States for so short a period of time that even though it be assumed that they have been employed in mining ever since their arrival, they must have had at most but a brief experience in the mines of this country. The data further show that extremely few of their number had mining experience abroad. Table I shows that, for example, over 80 per cent. of the Scotch and English miners had mining experience in their native country before entering the American mines, while for the south Italian and Croatian less than 5 per cent. have had mining experience. Most of the latter were farm laborers in their native countries, as indicated by this table.

Upon coming to the United States they decided to follow the occupation of mining because the work was better paid than any other obtainable, although many of them had been here only a few months and many more but a year or two.

TABLE V
PERCENTAGE OF EMPLOYEES WHO READ, BY GENERAL NATIVITY AND RACE.

General Nativity and Race	ANTHRACITE				BITUMINOUS COAL MINES							
	United States Bituminous		Penna. Anth.		Penna. Bitum.		Ohio-Ind.-Ill.		Okla.-Kans.		Ala.-Va.-W. Va.	
	Number	Per Cent. who read	Number	Per Cent. who read	Number	Per Cent. who read	Number	Per Cent. who read	Number	Per Cent. who read	Number	Per Cent. who read
Native-born of native father:												
White	18,097	96.9	23	100.0	6,406	97.2	5,833	97.4	1,616	97.5	4,242	95.1
Negro	6,479	75.3			900	87.9	566	91.1	374	90.1	4,639	69.7
Native-born of foreign father by country of birth of father:												
Austria-Hungary	813	96.4			584	95.7	172	98.8				
Belgium	50	98.0										
England (Includes Canada)	1,822	98.5			954	98.1	581	99.1	174	99.4	66	97.0
France	168	97.6			62	98.4	67	100.0				
Germany	2,184	99.1			1,188	99.0	848	99.4	100	100.0	48	93.8
Ireland	1,340	98.3			802	98.1	318	98.4	135	100.0	85	96.5
Italy	182	94.0			62	90.3	53	96.2	53	96.2		
Lithuanian			42	100.0								
Polish			61	95.1								
Russia	171	95.9			87	93.1	56	100.0				
Ruthenian			62	100.0								
Scotland	906	99.6			423	99.5	279	99.6	138	100.0	66	98.5
Slovak			64	100.0								
Sweden	64	100.0										
Wales	462	98.5			210	98.6	208	98.1				
Foreign-born, by race:												
Bohemian and Moravian	737	94.6			451	93.1	249	97.6				
Bulgarian	176	78.4									123	87.9
Croatian	2,404	66.9			1,957	65.5	182	70.9			251	73.7
Dutch	104	98.1			55	98.2						
English	2,478	97.7			1,310	97.1	803	98.1	248	99.6	117	96.6
Finnish	70	95.7										
French	765	91.0			334	88.9	190	90.5	205	94.1		
German	2,659	96.8			1,522	95.3	849	98.6	179	98.9	109	100.0
Greek	113	65.5			75	57.3						
Irish	924	93.5			660	93.0	126	92.9	94	97.9	44	93.2
Italian, North	6,584	87.8			3,346	86.3	1,700	93.0	1,149	90.9	389	68.9
Italian, South	4,197	65.7	50	52.0	2,219	67.2	417	63.0	412	81.6	1,149	58.1
Italian (not specified)	112	89.3			98	88.8						
Lithuanian	1,878	79.5	284	57.7	638	74.5	1,081	80.4	120	93.3		
Magyar	4,515	89.2			3,508	88.5	617	93.8	49	81.6	341	83.9
Mexican	107	81.3							105	80.9		
Montenegrin	134	69.4									91	62.6
Polish	7,293	77.3	263	68.4	5,991	76.9	798	76.3	208	85.6	296	80.7
Roumanian	154	74.7			102	69.6						
Russian	1,826	70.8			1,271	69.0	373	73.7	105	77.1	77	76.6
Ruthenian	303	59.4	202	65.8	281	58.0						
Scotch	1,148	99.1			561	98.8	346	99.1	141	100.0	100	100.0
Servian	130	77.7			85	75.3						
Slovak	11,238	82.4	185	73.0	9,945	81.8	784	86.0	129	91.5	380	86.6
Slovenian	1,877	83.6			1,539	83.1	96	81.3	185	95.7	57	61.6
Swedish	305	100.0			214	100.0	67	100.0				
Welsh	396	94.7			189	94.2	160	95.6				
Grand total*	86,908	86.7	1,239	71.7	48,747	85.2	18,333	92.6	6,785	93.6	13,043	80.8
Total native-born of foreign father	8,240	98.3	231	98.3	4,497	98.0	2,649	99.1	753	98.4	341	96.5
Total native-born	32,818	93.0	254	98.4	11,803	96.8	9,048	97.5	2,745	96.8	9,222	82.5
Total foreign-born	54,090	82.9	985	64.8	36,944	81.6	9,285	87.8	4,040	91.4	3,821	75.0

*This table includes only races with 40 or more males reporting. The totals, however, are for all races.

NOTE—Compiled from "Immigrants in Industries," a report of the Immigration Commission, 1911. Senate Document No. 663, Sixty-first Congress, Second Session. Vols. 6, 7 and 16.

Under these circumstances it is not surprising that they know little or nothing of rock formations, of fire-damp, of the properties of coal dust, and of the handling of explosives—matters about which every coal miner should be thoroughly informed. To determine whether a piece of slate or roof is or is not likely to fall often requires a considerable degree of experience, and the majority of the Slavs, Magyars and Italians have not this experience.

IMMIGRATION IN ITS RELATION TO MINING ACCIDENTS

The mines are presumably less safe than they would be with native American, English, Irish, Scotch, Welsh or German labor, because recent immigrants often accept more dangerous working conditions than the first-named employees. Furthermore, the later immigrants are ignorant and untrained, and are a source of danger to themselves and to the other workmen. Among the older mine workers the feeling is strong that the employment of non-English-speaking races has complicated the problem of safety

in the mines. They assert that carelessness on the part of recent immigrants, and the ignorance of those who are suspected of having obtained their places without having had the required experience as miners, have tended to render the mines less safe and thus increase accidents.

A large portion of the deaths and injuries reported for the coal mines of the United States occur among the non-English-speaking miners. The employees, consisting of the races of southern and eastern Europe, having had little experience in mining either in this country or abroad, are particularly liable to accidents, and as the responsibility for accidents rests in many cases with the men injured, to say that they are particularly liable to accidents is in effect to say that they are responsible for a considerable proportion of all the accidents occurring in the mines.

The mine accidents for which the workmen are themselves responsible fall naturally into two classes—those due to carelessness and those due to ignorance. As regards the first of

these, it is probable that the foreigner is no greater offender than the person of native birth. Many of the Americans and other English-speaking miners are undoubtedly reckless, and a large proportion of all the accidents occurring among their number seems to be due to this cause. Grave risks are often incurred for the sake of avoiding a little extra labor. Props are left unplaced, open lamps are used instead of closed lamps, cars are driven in a careless manner, explosives are handled recklessly—all in defiance of the most elementary rules prepared by men of long experience in the industry.

Among the recent immigrants, on the other hand, many of the accidents are unquestionably due to ignorance, for by reason of their lack of experience they do not see nor realize the dangers that confront them; nor do they readily comprehend the necessary precautions that must be taken to make their working places safe.

Lack of experience in the mines has a marked effect upon the high accident rate, as indicated by a study of accidents among the immigrants whose experience in mines, before coming to this country, was known. The fatal, serious and non-fatal injury rates in the coal mines of Pennsylvania and West Virginia are approximately 14.5 per 1000 for those of whom 10 per cent. had mining experience prior to coming to the United States. The accident rate for those of whom 10-20 per cent. had mining experience is about 12 per 1000, showing a rapid decrease as mining experience increases. It would seem from this that while experience is limited, these immigrants soon gain sufficient knowledge to use a certain amount of caution, thus giving a decline in accident rate.

EXPERIENCE DECREASES ACCIDENT RATE

As contrasted with the decrease in accident rates among those of whom 5 to 30 per cent. have had mining experience, the accident rate based on similar data for those of whom 50 to 60 per cent. have had mining experience prior to coming to this country is 10.5, whereas the rate is 12 for those of whom 80 to 90 per cent. have had experience in the mines. This shows a marked increase with the extra experience.

This is largely due to the tendency of those with considerable experience to become more or less careless or reckless and to think that they can slight certain features of work without an accident. A new man entering the mine would not consider for a moment crimping a cap with his teeth, whereas many of the men who have been in the mines for 8 to 10 years would not hesitate and do not hesitate to so crimp them.

Other instances of carelessness might be cited. The available data, therefore, seem to indicate that inexperience is responsible for many accidents, and that a little experience begets much caution on the part of the recent or new employee. As indicated above, there is thus a tendency toward a rapid reduction in accident rates to a point where between 30 to 40 per cent. of the employees have had mining experience. Beyond this percentage, caution wanes and is replaced by carelessness with a resultant increase. The green miner may be overcautious, but he lacks experience. The seasoned miner has the experience, but too often caution is replaced by carelessness. Caution combined with experience will go far toward accident reduction.

Another element of danger is contributed by the fact that few of the recent immigrants speak or understand English (Table III.), while almost none are able to read or write the English language. Placards of warning thus do not reach them. It is probable that the instructions of the mine bosses and inspectors are, because of this fact, frequently misunderstood. An inspector, for example, tells an immigrant miner, in English, of course, that his roof needs propping. The miner seems to understand, but does not, and a fall results.

In some mines printed signs are used to indicate the presence of gas or other peril. These signs are quite unintelligible to most of the foreigners. A common language is absolutely

necessary in every safety-first campaign. Accident rates are much lower in England, France, Belgium, Germany, Austria and Japan than in the United States. In these countries but few foreigners are employed, a common language being used in each country. The difference in fatality rates cannot be entirely attributed to the lack of mixed languages, but certainly a large percentage of the accident reduction may be attributed to the "common-language" mines.

A comparison of accident rates with the ability of the miner to read some language or to speak the English language, shows that the ability to read, although it may not be English, has a greater influence on accident reduction than the ability to speak English. This may be accounted for by the fact that ability to read develops a higher degree of intelligence and places the employee in a better position to realize dangers more readily than one who cannot read. Furthermore, if he is able to read, he is more likely to heed danger signs put up in certain places.

TABLE VI—PERCENTAGE OF EMPLOYEES BY OCCUPATION AND ENGLISH-SPEAKING AND NON-ENGLISH-SPEAKING RACE.*

	Americans and Western Europeans		Southeastern Europeans	
	Number	Per Cent	Number	Per Cent
Superintendents	10	.78	....	....
Foremen	14	1.10	....	....
Bosses	78	5.96	6	.28
Inspectors	10	.78	15	.70
Engineers and Motormen	50	3.92	12	.56
Firemen	29	2.27	10	.47
Electricians and helpers	12	.94	7	.33
Blacksmiths and machinists	33	2.59	13	.61
Carpenters and masons	46	3.61	9	.42
Track and roadmen	64	5.02	21	.97
Car runners, droppers, etc.	47	3.69	49	2.28
Drivers and teamsters	124	9.73	67	3.12
Machine runners and helpers	75	5.88	148	6.90
Pick miners	428	33.57	1,107	51.61
Loaders and scrapers	45	3.53	379	17.67
Trappers	16	1.26	20	.93
Pipe and pumpmen	20	1.57	7	.33
Laborers	176	13.80	271	12.82
Total	1,275	100.00	2,141	100.00

*Represents ten typical bituminous coal mining companies of Pennsylvania.

The recent immigrant, because of his lack of experience, his inability to speak English and his keenness for earning money, is often willing to work in places where more experienced or more intelligent men would refuse to work. For the same reasons he will frequently be satisfied with and accept mine equipment too defective for safety.

OCCUPATIONS OF ENGLISH-SPEAKING AND NON-ENGLISH-SPEAKING RACES

Table VI. shows comparative figures by occupations, based on the pay roll of ten typical coal-mining companies in Pennsylvania. These figures show that about 33 per cent. of the English-speaking employees are employed as pick miners as compared with about 52 per cent. for the southeastern Europeans. As a matter of fact, from trackman to loader, the English-speaking employees represent about 61 per cent. of the total, as compared with 82 per cent. for the southeastern Europeans. These figures, therefore, indicate that the non-English-speaking foreigner is employed in the most hazardous of the mine occupations, hence one reason for the higher accident rate.

For comparison of accident rates between the two groups of employees, the figures given in Table II. are representative. In the Pennsylvania anthracite mines 43 per cent. of the employees are English-speaking, and this number is charged with only 23.8 per cent. of the fatalities, whereas the other 56 per

cent. (representatives of continental Europe) sustained 71 per cent. of the fatalities. Likewise, in the Pennsylvania bituminous mines the English-speaking employees represent 35 per cent. of the total and are charged with 27 per cent. of the fatalities, whereas the other 65 per cent. (representatives of continental Europe) are charged with 73 per cent. of the fatalities.

As regards the figures for West Virginia, the English-speaking employees represent 67 per cent., and notwithstanding the fact that this includes 17 per cent. of colored employees only 53 per cent. of the fatalities are charged to the English-speaking employees, whereas the other 33 per cent. of the men employed sustained 47 per cent. of the fatalities. Almost the same ratio holds for non-fatal injuries in the three groups of mines cited.

Had the fatality and injury rate for the English-speaking American been maintained throughout the three groups of mines, there would have been a saving of 716 fatalities and 900 serious injuries. This is a strong argument for Americanization and education of the miner.

Bituminous Coal Operators Reply to McAdoo by Telegram

Below is a copy of the telegram which was sent on November 25 by Bituminous Coal Operators to William G. McAdoo:

Hon. William G. McAdoo,
New York, N. Y.

Inasmuch as your message of November 24 was released for publication and thus became a message to the public, we take the liberty of answering it in the same manner. The mine owners are opposing a wage increase at this time for the reason that they believe no increase in wage rates is necessary to permit any industrious man who wants to work to earn sufficient money to maintain a decent American standard of living. This point, together with all others, they have offered to submit to arbitration or investigation.

Upon what current facts and figures are you convinced that the increased rates of wages proposed for the mine workers are just and reasonable? Upon what current facts and figures are your grave doubts based as to whether the mine owners are entitled to increase the price of coal to the consumers? If you have current facts and figures to substantiate your conviction and doubts, you will make a good witness for the miners before a board of arbitration or tribunal of investigation which thus far they have firmly declined to agree to. If you have not these current facts and figures your mere personal opinion has no weight.

Your admission that conditions in 1917 were abnormal is agreed to. When the world goes to war conditions are certainly abnormal. So far as the mine workers were concerned this abnormal condition was recognized by two abnormal increases in wages during the year 1917, and the United States Government promptly put an end to abnormal coal prices. It would be interesting to have your recollections regarding the tax reports made by other industries which were not so restrained. As you proceed to admit your ignorance of conditions in 1918 and 1919, that portion of your message carries no weight and requires no answer.

You suggest a careful examination of income tax returns before an additional price for coal is allowed. This would be included in the investigation which the mine owners agreed to more than a month ago and have been urging ever since, but thus far the mine workers have been unwilling to agree either to arbitration or investigation. Either procedure will disclose not only the current tax returns of the mine owners but of the miners as well. The figures are here in Washington and can be readily produced if you can get the mine

workers to agree. The bituminous coal operators will welcome the publication of just as full current tax returns for the bituminous coal industry as are published for any other industry.

In the last two paragraphs of your message you again suggest investigation and also that the mines resume operation. Either your newspapers are not reaching you, you are not reading them, or you have deliberately ignored the published facts. Upon October 24, in Washington, the mine owners promptly and without reservation agreed to the proposition made by President Wilson that the mines be continued at work and the entire matter be submitted to a board of arbitration. Upon October 31, in Cleveland, the mine owners agreed to President Wilson's later suggestion that the whole matter be left to a tribunal to be appointed by him to investigate the facts. Upon Thursday, November 20, in Washington, the operators offered three resolutions to the sub-scale committee of miners and operators each referring the entire matter to arbitration, and they were all voted down by the miners.

McADOO APPARENTLY MISINFORMED

Upon November 19, in Washington, Federal Fuel Administrator Garfield, based upon the statistics collected by his officials, stated "That the average realization upon 579,385,820 tons of bituminous coal mined in 1918 was \$2.61 per ton, that the average cost of production during the same period was \$2.15 per ton," leaving an average margin of 46c per ton to the operators. Mr. Garfield was then careful to state that "This margin of 46c per ton includes profit but does not represent profit only, inasmuch as interest charges, selling expense, Federal taxes, both normal and excess profit, as well as certain other items not allowed in computing costs of production, were paid out of it." The average income and excess profits taxes paid "were upwards of 30c per ton in 1918." From the remaining 16c per ton, after deducting interest charges, selling expense, as well as certain other items not allowed in computing costs of production, come the net profits to the operator which are so shocking and indefensible to you.

If this message had not come from a former prominent official, supposedly accurately informed, it would not deserve the notice of a reply, but its misleading statements and insinuations are the kind of stuff which Bolshevism breeds upon. Whatever your purpose it is in exceedingly bad taste for you, a former member of the cabinet of the present Administration, to inject yourself into the present tense situation in a manner which can only embarrass and handicap those officers of the Government who are now bending every effort to work out a solution of the mine wage controversy in a manner which will do justice to all parties concerned.

Respectfully,

For the bituminous coal operators:

T. T. BREWSTER,
A. M. OGLE,
T. W. GUTHRIE.

New Coal Order Issued

Effective Nov. 24, 1919, an order was issued by Dr. Garfield, which states that coal dumped into barges, scows, boats and other vessels, on lakes, rivers and other inland waterways, shall be subject to diversion in like manner and to the same extent as bituminous coal loaded in cars of a common carrier, under his orders now in effect relating to the diversion of coal in transit, and coal diverted under the authority of this order shall be paid for by the party receiving the same, in accordance with the provision relative to the payment for diverted coal contained in his order dated Nov. 12, 1919.

No. 1 Plant of the Mather Collieries

By DONALD J. BAKER
Pittsburgh, Penna.

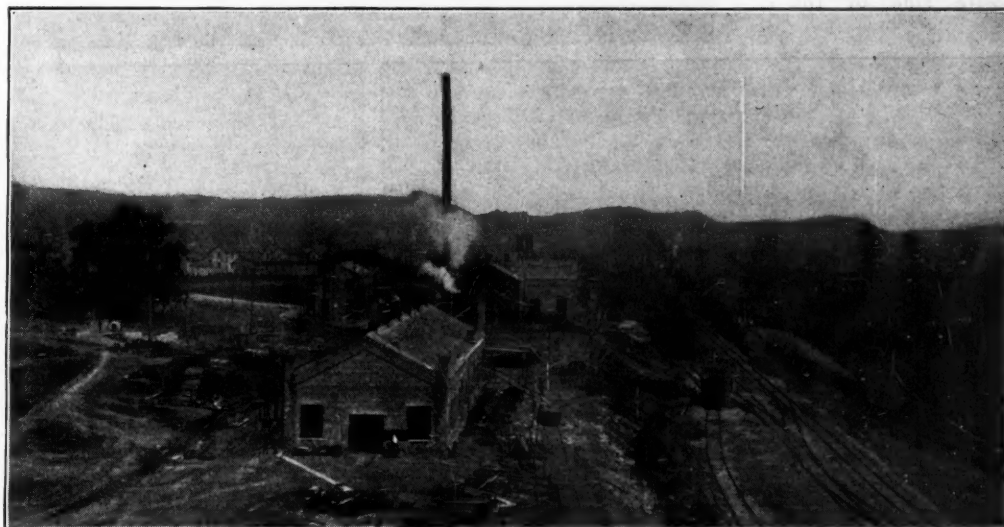
The plant, which is designed for a capacity of 5,000 tons in eight hours, was begun in August, 1917, and for a considerable time all material had to be hauled some five miles overland. General construction of the plant is first class in every respect, while the design of the surface equipment is compact and convenient.

ONE of the coal-mining plants of western Penn. that will doubtless play an important part in the development of Greene Co. is the No. 1 plant of the Mather Collieries, at Mather, Pa. Pickands, Mather & Co., of Cleveland, O., are the operators and the entire output of the mine will go to the byproduct ovens of this company at Toledo and Canton, O., or to the furnaces of the Steel Co. of Canada or the Cleveland furnaces of Allied Steel Companies. More than 4500 acres of the Pittsburgh bed are available. This

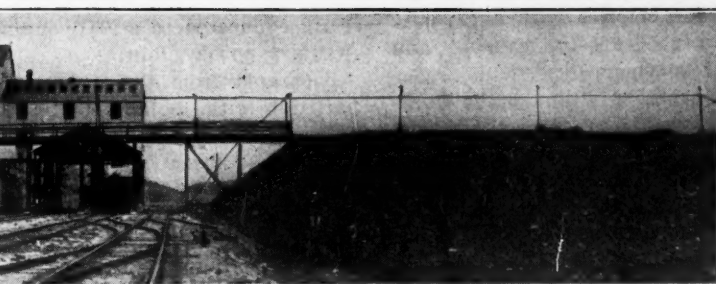
Ground was broken for the first shaft on Aug. 7, 1917, on the old Moredach farm, near the rural village of Jefferson. Rice's landing was the nearest railway connection, and all of the materials that went into the construction of this large bituminous operation had to be hauled overland from that point.

To visit the plant now and note the completed construction of the surface equipment, the 140 occupied buildings, with 60 more in various stages of completion, is to learn what it is possible to do by dint of hard effort in conjunction with a

GENERAL VIEW OF
THE TIPPLE SHOW-
ING ARRANGEMENTS
FOR HANDLING
SLATE



BIRDS EYE VIEW OF
THE SURFACE
BUILDINGS AS SEEN
FROM THE TIPPLE



has a general thickness of 7 ft. Some 500 acres of surface property are owned by the company, which includes the present plant and town and leaves room for expansion on a large scale. The town of Mather lies about five miles overland from Rice's Landing, on the Monongahela River, and is reached by the Monongahela Division of the Pennsylvania R. R. out of Pittsburgh.

It is doubtful if any plant of recent years has had the quick growth that will allow it to compare with this operation from the standpoint of development under trying circumstances and what at first appeared to be insurmountable obstacles.

constructive spirit that recognizes no difficulties. All of the work was accomplished during the high tension period of the war and simply brings to light another instance of unalloyed Americanism as practiced in an out-of-the-way district, where duty to country overshadowed any one outside motive.

There are two shafts at Mather, one being used for coal while the other is used exclusively for air and materials. Five main entries lead away from each shaft bottom, three of which are for haulage purposes. The butt entries are driven 310 ft. apart while the rooms are being developed on the panel system on 100-ft. centers. An average dip of the bed of $1\frac{1}{4}$

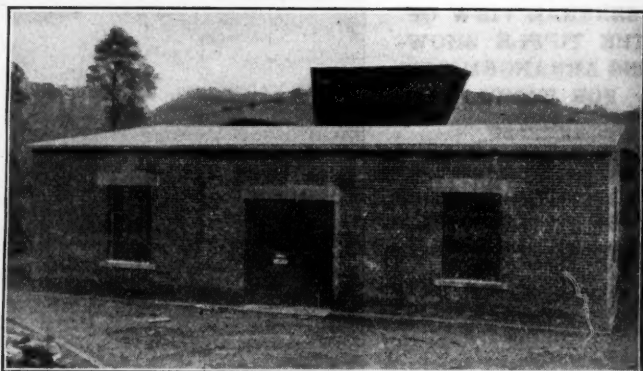
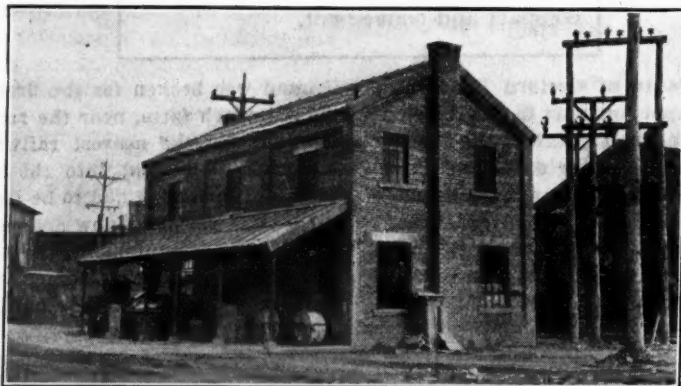
per cent, is found throughout the tract. With the development of the mine on the upgrade of the slope, the haulage of loaded cars is facilitated and the water drained from the workings more easily. Little water has been encountered as yet, and this has been allowed to collect at a small sump at the bottom of the main shaft whence it is voided to the surface by the periodical operation of a small triplex Deming pump electrically driven from a 20 h.p. motor.

Trolley type, 15-ton Jeffrey locomotives are in use on the main haulageways, with 7-ton, storage-battery, Jeffrey locomotives in operation as gathering motors. The gage of the track is 44 in. with 60-lb rails on the main haulage roads, 40-lb. rails in the sub-entries and 25-lb. rails in the rooms. A complete telephone system has been installed underground with connection to all officials on the surface. At the bottom of the shaft the haulage entries are double tracked, and concrete-arched for several hundred feet on either side. Storage tracks at the bottom of the shaft can accommodate 75 loaded cars, from where they are caged by a gravity run to the shaft. On the opposite side of the

eight hours. A small room contains a liquid control which governs the speed of operation as well as the length of cable payed out by the drum.

The power and boiler rooms are under the same roof and are of brick construction with tile roofing and cement flooring, which is characteristic of all the plant buildings, except the tippie. Three 350- k.v.a. transformers located on the outside of the building reduce the current from 22,000 volts to 2,200, power being received over the high-tension line of the West Penn Power Co. The transformers here used were manufactured by the Pittsburgh Transformer Co. From the transformers, the current enters the power-house, which is 64x36 ft., and passes into two 250-kw. Westinghouse motor generator sets where the 250 direct current voltage used within the mine is produced.

A Vulcan hoist for the material shaft is directly connected to a 300-hp. Westinghouse induction motor operating on 2,200 volts. A daily capacity of 2,000 tons of material can be handled at this shaft. Another unit of the power-house is a 250 k.v.a. alternating current Westinghouse generator di-



SOME OF THE BUILDINGS THAT COMPOSE THE PLANT AT MATHER.

UPPER: LAMPHOUSE AND TEMPORARY HOSPITAL. LOWER LEFT: THE MACHINE SHOP AND SUPPLY HOUSE. LOWER RIGHT: FAN-HOUSE. ALL BUILDINGS ARE OF THE SAME TYPE OF CONSTRUCTION

shaft there is a storage yard for empties with a capacity for 100 cars. The mine cars are of 2½-ton capacity and are equipped with Hyatt roller bearings.

Edison storage-battery lamps are used, although the workings have been singularly free from gas. Cutting the coal at the face is accomplished through the operation of Sullivan shortwall machines, after which it is drilled by the hand auger method. Permissible explosives are employed in the shooting.

The two shafts are of the three compartment design and identical with each other in respect to depth, this being 350 ft. They are also similar in general construction. Each has outside dimensions of 34x12 ft. and is concrete-lined with steel buntion support. Over 140 tons of steel are contained in each head-frame. These are of the same design and were manufactured by the Morris Iron Works of Wheeling, W. Va. Both have heights of 104 ft. Self-dumping cages in the main shaft are operated by a Vulcan hoist in the adjacent hoisthouse.

The hoisthouse is of brick construction with cement flooring and tile roofing, and is 39x30 ft. in size. Direct connection is made from the engine to a 1000-hp. Allis-chalmers induction motor working on 2200-volt alternating current. This gives the hoisting apparatus a capacity of 5,000 tons in

rectly connected to a Ball engine which forms part of the auxiliary power plant.

Separated from the power, or dynamo room by a brick partition is the boiler-room, 36x30 ft. containing a 300-hp. Babcock & Wilcox boiler which produces steam for the operation of the alternating-current generator in the adjacent room. This boiler is equipped with a Cochrane feed-water heater. For the operation of drills within the mine and about the surface plant a steam-driven Sullivan air compressor has been installed. Distilled water for the storage batteries of the locomotives and the safety lamps is procured from a Rochlitz water still, manufactured by the W. M. Lalor Co., of Chicago.

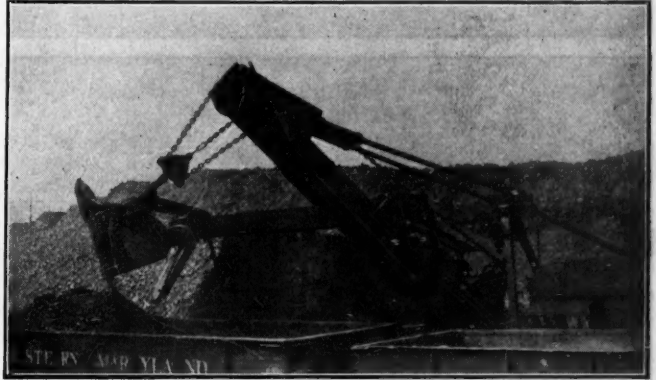
A spacious tippie is situated at the main shaft and is of steel framework with corrugated asbestos siding, supplied by the Keesby & Mattison Co., of Pittsburgh. The steel framework was supplied by the Lackawanna Bridge Co. Cement floors throughout allow for the building to be kept fairly clean at all times. As the cars on the cages are dumped, the coal drops into a hopper which feeds onto two rows of picking tables through steel chutes. C. R. Miller & Son, of Scottdale, Penn., manufactured the picking tables, which are about 20 ft. long, giving the pickers ample opportunity to prepare the

coal before it enters the loading boom, from which it passes to the cars underneath.

Through the action of a steel door which is operated at the dump, mine cars containing rock and refuse are unloaded into a rock bin with a capacity of 60 tons. This also collects the refuse from the picking tables by a conveyor leading from them. The rock is automatically loaded into 10-ton slate larries of the trolley type. The larries are driven to the rock dump, located to the fore of the tippie. The arrangement is shown in one of the photographs. Mather Siding is the name given to the railroad connection, which leaves the Mononga-

which are arranged in tiers of bins and classified according to use. This simplifies the finding of any article. Part of the supply-room is a toilet and wash-room that is available for the use of all men in the building.

Another unit of the surface plant is a building, 41x24 ft., that is utilized as a combination lamphouse, temporary hospital, mine foreman's office and first-aid room. A small Westinghouse motor-generator set is contained in the lamphouse, from which 400 Edison safety lamps are recharged through rheostats. To permit of their being more easily handled for recharging, the customary arrangement in shelving is made.



TWO VIEWS OF THE STEAM SHOVEL AT WORK LOADING THE STORED COAL

hela Division below Rice's Landing and has just recently been completed.

From the beginning of operations in 1917, up to the time that the railroad spur was completed, the mine was under development and the coal brought to the surface and removed to a nearby cut adjacent to the railroad then under construction. Before the siding was completed, the coal had accumulated until a pile that reached considerable proportions had been built up. This coal is now being loaded directly into railroad cars by means of a 70-ton Bucyrus steam shovel. More than half of the original pile has been removed to date. This feature, along with the tippie, will keep the daily output at a respectable figure until such time as the plant will be working to its capacity of 5,000 tons in eight hours. In conjunction with the steam shovel a standard-gage locomotive is employed by which the loaded cars are placed on the siding below the tippie.

The shop and supply-house is situated midway between the power plant and main hoisthouse. On the outside of the building, the 2200-volt line running to the main hoist is tapped and the current further reduced to 110 and 220-volt alternating current by three 25 k.v.a. Pittsburgh transformers. Direct current at 250 volts is also carried into the building to be utilized with the alternating current for testing, etc.

Three brick partitions divide the building, the over-all dimensions of which are 138x39 ft. The fore part serves as a blacksmith shop and contains two forges, an electric power hammer and a gas furnace for the heating of machine bits. Adjoining this is the carpenter shop, which contains among other things an electric bandsaw, a circular saw and a hacksaw. The room is well lighted by many windows. Another compartment of the building is taken up as a machine shop and contains lathes, bolt and pipe machines, radial drill, hacksaw, emery wheel, punch and shears, etc., all of which are electrically driven. A 20-hp., 220-volt Allis-Chalmers motor is situated in one end of the room and drives a shaft running lengthwise through the building. All of the different machines in the shops are operated by belt drive from the shaft, with the exception of the saws in the carpenter shop which are operated by separate motors.

A fourth room of the building is utilized as a supply-room and contains equipment, spare parts and general supplies

Situated to the side of the power plant is a brick fan-house, 60x30 ft. in size, that contains a 15-ft. reversible Jeffrey fan which is belt-connected to a 100-hp. alternating-current motor with a 30-hp. motor in reserve. The intake to the mine is in the air and material shaft already mentioned.

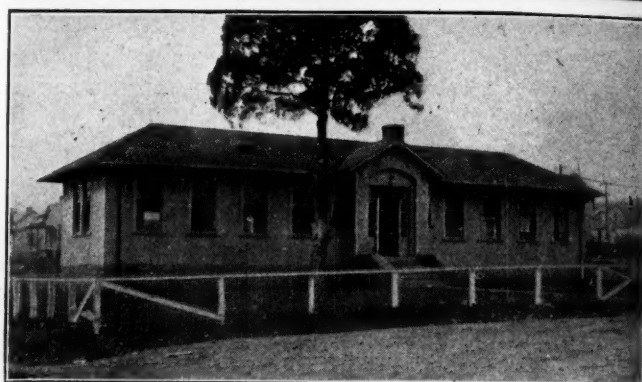
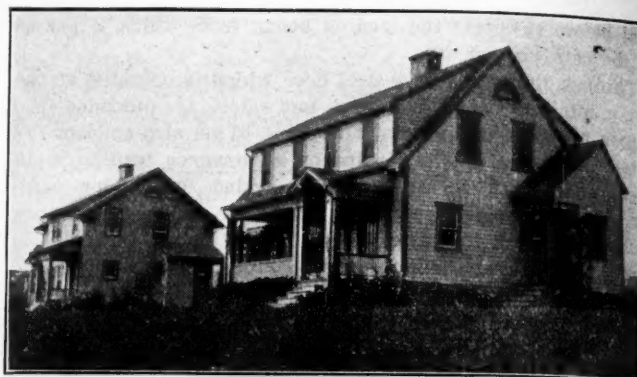
One of the features of the underground construction is a sand and oilhouse that is located in a room between the two shafts. A borehole from the surface will be utilized for transferring oil and sand underground, and results are expected that will mean the saving of much time that would ordinarily be consumed in moving these materials down the shaft. At the same time the easy accessibility of this room to locomotives switching for a train of empty cars is no small consideration.

GENERAL AIR OF CLEANLINESS PERVADES PLANT

The general cleanliness and lack of noise around the entire plant gives a lasting impression. With the exception of the tippie, the surface buildings are closely grouped together in a manner that is quite pleasing and should go far toward establishing a general unity of purpose among the men as well as simplifying the different operations. To allay any possibility of dust and dirt reaching the plant in general, the tippie is situated a short distance from the other buildings. A brick constructed filtration plant is at present being built. Water from a nearby reservoir will pass through a W. B. Scaife purifying apparatus. From the reservoir the water will be pumped to a tank located on the hillside, from where it will be available for the town by gravity.

An attractively designed office building of stucco construction completes the main units of the surface plant. This building has but one door and dimensions of 70x25 ft. All the plant buildings are heated by Hecler Bros. pipeless furnace method.

Community and welfare work under the direction of the general superintendent, W. L. McDonald, has progressed to a high degree and is reflected in the building of the town. As previously mentioned, there are 140 occupied dwellings in the village and 60 more are in various stages of construction. The houses are of different designs and of frame and stucco construction. They contain from two to six rooms with cellars, electric lights and running water. Eight-room dwellings with baths, toilets and all modern appointments are avail-



TYPES OF BUILDINGS THAT MAKE THE TOWN OF MATHER DISTINCTIVE

UPPER LEFT: STREET SCENE. RIGHT: TWO ATTRACTIVE HOMES. LOWER LEFT: THE CLUB-HOUSE. RIGHT: GENERAL OFFICE BUILDING. MANY OF THE HOUSES AT MATHER ARE OF STUCCO CONSTRUCTION

able for those desiring greater conveniences. Macadam streets have been laid throughout the town, and the usual muddy roads are conspicuous by their absence.

Two eight-car community garages have been built and are used by the employees. They are heated during the winter months by Wasco heaters. Present plans call for an additional building of the same type.

A moving-picture theater is nearly completed. The fore part of this building will be taken up with one room as a drug store and another as a restroom and library. The building has two floors, the basement of which contains bowling alleys and pool tables. Situated directly across the street from the theater is a commodious hall that will furnish space for dancing and basket-ball during the cooler months. Forming part of the group of buildings that make up the civic center of the town is a modern schoolhouse which is of characteristic stucco construction, as are all of the community buildings. Space for a completely equipped playground is available in a nearby lot.

A company store completes the main group of community buildings. A portion of the building contains a Johns-Manville Co. refrigeration plant. It is electrically operated and will supply ice for the town as well as that needed for the store.

UNIFORMED POLICE FORCE IS PRESENT

An innovation for a town of this size and age is a uniformed police force. Whether the uniforms tend to create a better morale cannot be proved, but little disorder is ever encountered in the town. Perhaps the greatest benefit that has resulted from the police force is the keeping of the alleys of the town free from obnoxious garbage and unsightly tin cans.

A graduate nurse does community visiting, during which talks on domestic science are given as well as on sewing and other kindred subjects. In the summer months also, one day each week is given over to a picnic for the younger element, at which time instruction is given on cleanliness and discussions take place that lead to better Americanism. Cases of

sickness within the community are under the direct supervision of the nurse.

First-aid work among the men is encouraged and classes are graduated at regular intervals. No formations into teams have been made to date, although this will be done in the near future. Meets with surrounding mines will then be held and a general competitive spirit aroused. There are 12 Government-trained mine-rescue men employed at the mine. They are a unit of the Orient central rescue station. In case of an accident in the district of which Mather is a part, all apparatus from adjacent mines is pooled for the common cause. Five sets of Gibbs self-contained breathing apparatus are kept at Mather for immediate use.

The officials of Mather Collieries are Frank Armstrong, general manager; W. L. McDonald, general superintendent; G. Herbert Evans, superintendent, and R. K. Newhouse, mine foreman.

Legal Department

WHAT CONSTITUTES DOING BUSINESS IN A STATE—A sporadic or occasional sale made by a non-resident coal company in a state will not constitute such doing business there as will subject the company to suit on a summons served upon one of its managing officers found in the state. But doing business within the state does not require that it be done persistently and continuously, in order to authorize such service of process. The mere fact that the general manager of a West Virginia coal company resided in Cincinnati and kept a file of company matters there for his convenience in corresponding with his company did not constitute a "doing business" in the state of Ohio. Other evidence in the case, however, is held sufficient to show that the company transacted business generally in the state, making it proper to serve summons on the general manager in Ohio in a suit brought against the company there. (United States Circuit Court of Appeals, Sixth Circuit; *Lyons vs. Empire Fuel Co.*, 257 Federal Reporter, 890)

Primary Considerations in Hydraulic Stowing*

BY C. A. JOHN HENDRY, F. R. G. S., A. M. I. M. E.

THE flushing of anthracite coal mines with silt and fine rock or slate has been carried on in the United States for many years with great success. In fact the idea originated in the United States, and the method has been adopted with certain modifications by various other countries. British engineers term the process "hydraulic stowing," and the following article notes conditions prevailing at various mines in India where stowing is practiced. Certain factors should be taken into consideration before a definite plant is decided upon in introducing hydraulic stowing in a mine and suggestions are here made as to the lines along which such preliminary investigations should be conducted.

Looking at the matter from a purely hydraulic standpoint, the delivery of stowing hydraulically through a pipe is subject to the following elementary rules: (1) The loss by friction is proportional to the length of the pipe; (2) it varies roughly as the square of the velocity; (3) it varies inversely with the diameter of the pipe; (4) it increases with the roughness of the pipe surface; (5) it is independent of the pressure. The introduction of some lubricating element in the stowing material, such as nodules of clay, is possibly well worth consideration for it would reduce wear on the pipes carrying the stowing material.

The coefficient of friction naturally varies with the velocity of flow and the diameter of the pipe. With a comparatively short pipe it may be necessary to consider losses due to elbows or bends in the pipe line. Where (as is usually the case) the length of the pipe is greater than 1000 times the diameter, the velocity head and the loss of head at the entrance need not be considered, for it is so small in comparison to the frictional losses as to be quite negligible.

LOSS OF EFFICIENCY IN PIPE LINES

Generally speaking, in long pipes we may ignore losses due to entrance, bends and variations in the pipe sections. The effect due to bends is of small importance compared with other frictional losses, and it is with these other frictional losses that we are chiefly concerned. If sand stowing, or packing, is to be carried out on definite lines, it will be necessary to find out the relation of head to length of pipe line, the ratio of sand to water and the velocity to the size of the pipe.

All these things will have a definite relation one to the other, and if the system is to be carried out on a large scale then it is desirable to collect information and to experiment so that a basis may be established for common use. It may be an exhaustive matter to derive suitable coefficients for all conditions, still there is no reason why the behavior of certain mixtures, such as one part of sand to three of water, should not have certain coefficients of friction worked out for them. Then the velocity (and therefore the rate of supply) can be determined; or the maximum length to a certain head can be derived and the cost of an installation and its capabilities can be worked out with some exactness prior to the commencement of the work.

*From a paper read before the Geological and Mining Society of India.

Rough experiments have shown that the ratio of sand to water varies in direct proportion to the head and the length of the pipe, while the frictional coefficient is doubled when sand is introduced to the maximum carrying capacity of the water. Such results should be checked with pipes of a greater head and length; then we will find that the effect of a bend at the entrance will be less evident and the flow steadier. Roughly speaking, where the proportion of the head to the length is 1 to 5, then the proportion of sand to water will be about 1 to 3; or where the proportion of the head to the length is 1 to 3, then the sand to the water will be about 1 to 15. However, the capacity of an installation will depend upon the size of the pipes and the velocity of flow in them; it would be an advantage if experiments as previously suggested could be carried out in instances where systems were in actual use so as to determine the proportionate results with some degree of accuracy.

PLANNING A STOWING SYSTEM

To determine the size of a pipe for use under certain conditions it will be necessary first to decide upon the rate at which stowing (flushing) is to be done. Furthermore, the velocity of discharge will bear a definite relation to the diameter of the pipe and its length. Hence, the first problem will be to determine the most economical proportion of the head to the length of pipe underground. The problem is to determine whether it would be more economical to put down a series of boreholes direct to the various portions of the workings to be flushed, or whether it would be better to establish one or two main points of flushing supply pipes from the surface to the mines and use long lines of pipe underground.

This problem will be influenced by the following considerations: (1) The rate at which the flushing must be done; (2) nature of the strata to be bored; (3) quantity of water available; (4) grade of the underground pipes; and (5) the velocity of flow of the flushing mixture. It should be remembered that there is a limit or the minimum velocity at which the mixture will flow; at velocities below this minimum the sand held in suspension will gradually increase frictional losses until movement of solids practically ceases. On the other hand, high velocities of mixtures result in abnormal and costly wear of pipes.

The wear on the pipe due to friction would vary with the proportion of sand to water—the more water used the less the friction. However, it should be considered that the more water used the greater will be the expense for pumping out the water after it had been used for flushing. It would be a nice balance of costs to determine which would be the most economical mixtures.

Having determined upon the output and velocity, it will be a simple matter to gage the head required, to work out the most convenient flushing or feeding point at the surface and to calculate the dimensions of pipe required. Where the head is inconsiderable it would possibly be an advantage either to put down two or more boreholes, or to supplement the head by the introduction of a pumping unit.

The disposal of the flush water and its clarification are important. In certain mines where the pitch of the seam is steep enough, it may be cheaper to flush the sand to the workings through a flume or trough. This method can be used when the pitch is 15 deg.; or even at a less pitch if the proportion of sand to water is high. It may be necessary to bring the flushing water from a distance; this might be offset by the greater availability of river sand in a dry season. If the distance to move the mixture on the surface is considerable, and the grades favorable, then an open flume may be more economical than a pipe-line.

Regarding the character of the pipes to be employed we may consider: (1) Cast iron; (2) wrought iron; (3) wood; (4) terra cotta; and (5) porcelain lined. The shape in comparatively small installations would be circular, but ovoid pipes may be considered in special cases. In general it will prove economical to employ thicker cast-iron pipes for flushing lines than is usual in the case of pipes used for water only; in no case is it advisable to employ them under $\frac{1}{2}$ in. in thickness, as the tensile strength is low and uncertain.

If, for economic reasons, cast-iron pipes must be employed, it is advisable to have them as thick as practicable. For instance, assume the outer diameter of a pipe is 7 in. and the inner 6 in., then the cross-section area of pipe metal would be 10.21 sq.in. If we increase the outer diameter of the pipe to $7\frac{1}{2}$ in., and keep the inside diameter 6 in., then the section area would be 15.904 sq.in.; there would be an increase of 5.694 sq.in. in section. Thus, for scarcely more than half as much more metal, the life of the thicker pipe will be double as long as in the first case; this is true provided we assume the pipe will give trouble and have to be discarded when its thickness get below, say, $\frac{1}{2}$ inch.

MATERIALS USED IN STOWING PIPES

Wrought-iron pipes are not particularly suitable for use on longitudinal lines, as their cross-section is comparatively small; they have, however, the advantage of considerable length, resulting in fewer joints, and their fibrous structure (if unriveted) offers less resistance than granular sections.

For underground pipe lines wood might be profitably employed in special cases; the pipes consist of a number of staves, their edges bevelled at an angle radiating to the center of the pipe and bound around at intervals with steel ties arranged with a take-up block to insure efficient tightening. The staves would be 1 to 3 in. thick, depending upon the size of the pipe. The pipe would be bulky and not generally adaptable. Pressures up to 200 lb. per sq.in. are possible, though 150 lb. would be a satisfactory maximum. With higher pressures it is likely that water would be forced through the pores of the wood.

The porcelain-lined pipe is possibly debarred by its high cost from adoption in cases where coal is mined and sold at a particularly low figure. It is possible that vitrified terra cotta may be suitable for underground use, as when vitrified it is coated with an impervious vitreous lining on which acids and alkalies make no impression. This is an important point, as in some cases a good proportion of the wear of pipes is due to the acidity of the water. It may be possible for interested concerns in India to devise means of materially increasing the vitreous lining to suit the peculiar conditions of use. The average pipe can be made to stand a

reasonable pressure, say, 100 lb. per sq.in. The joint will, of course, be somewhat difficult and tedious to make. In Pennsylvania half-section glazed-tile pipe has been used on the surface for carrying silt and water to great advantage; this transportation line constituted an open trough.

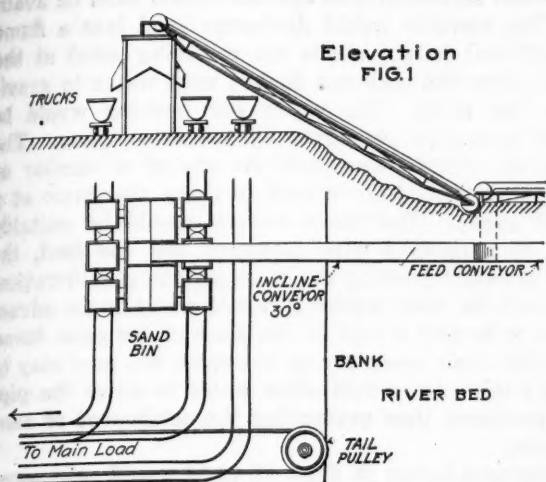
In all cases it will be advisable to arrange so that the pipe can be turned around, if desired, as the wear will be greater on its lower portion. Continental experiments have shown that steel pipes must be changed or turned over when 97,446 cu.yd. (74,500 cu.m.) of stowing material, made up of waste from the washeries, broken boiler cinder, etc., had been flushed through them; while the same attention was necessary after 56,506 cu.yd. (43,200 cu.m.) of sand had passed through the pipes. With cast-iron pipes it was necessary to turn them over after the flushing through of 68,016 cu.yd. (52,000 cu.m.) of waste from the washeries, or 59,906 cu.yd. (45,800 cu.m.) of sand. The steel pipes in this case had a thickness of $\frac{5}{16}$ in. (8 mm.) and an internal diameter of $7\frac{1}{2}$ in. (185 mm.). The cast-iron pipes had a thickness of $\frac{3}{8}$ in. (10 mm.) and an internal diameter of $5\frac{1}{2}$ in. (150 mm.).

CONSIDERATIONS INFLUENCING MATERIALS USED

In the Jharia, India, coal field the proximity to sand areas renders one apt to overlook other sources of packing nearer at hand. It might, for instance, be more economical to remove the overburden (surface) covering coal on the outcrop and utilize this if suitable; or even put it through crushers in the case of hard or lumpy material in order to reduce it to its requisite fineness, before using it in the mine. There might be cases where local material which requires crushing may prove more economical than obtaining something from a distance; at the Rand mines in Africa the whole of the tailings is often utilized for this purpose.

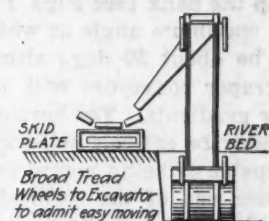
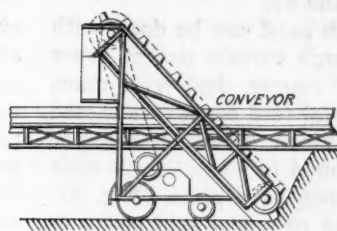
The following points require attention when considering the question of transporting sand from its source of supply to the mines: (1) Accessibility of the sand; (2) cost of transportation to the mines; (3) method of packing. In the case of India, whether the sand is required for the Dishergarh or Jharia field, the accessibility of supply is practically the same; but in the case of transport there are two entirely different problems to be dealt with—one in which mines are near enough to the river to draw their supply of sand, and the other where mines are at such a distance as to render the capital outlay prohibitive without coöperation between adjacent mines.

The packing may be deposited in a bin or reservoir adjacent to the mine or above the workings, and be washed down a pipe, the head being sufficient to drive the sand up to the required position. There will also be cases where it is possible to sink a borehole in the river bed and feed with sand direct; in this case the pipe should be fitted with valves at the surface and also (as an additional safeguard) at the foot, in order that they may be closed during flood periods. Otherwise the loading from the river bed will, in a measure, depend upon the method of transportation adapted to the mine. In any case it is safe to assume a severe gradient will have to be negotiated from the river bed to the bank. The work on the bed will in a majority of cases have to be of a temporary nature suitable for rapid removal and therefore a separate unit to the main pipe line. For this, light belt conveyors may be suggested, one

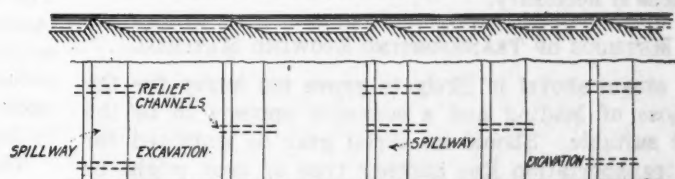


Plan FIG. 2

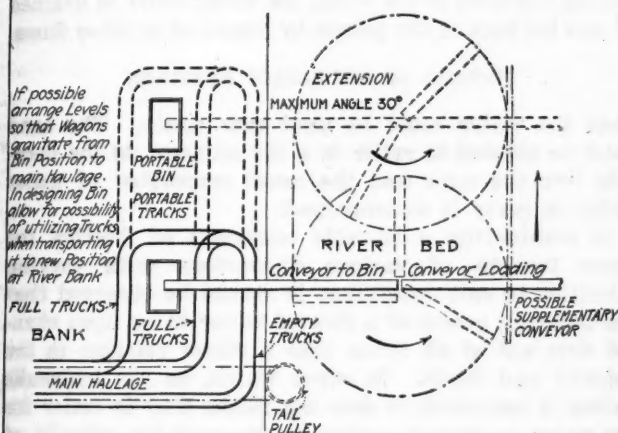
METHOD OF RAISING SAND FROM RIVER



EXCAVATOR FOR LOADING CONVEYORS

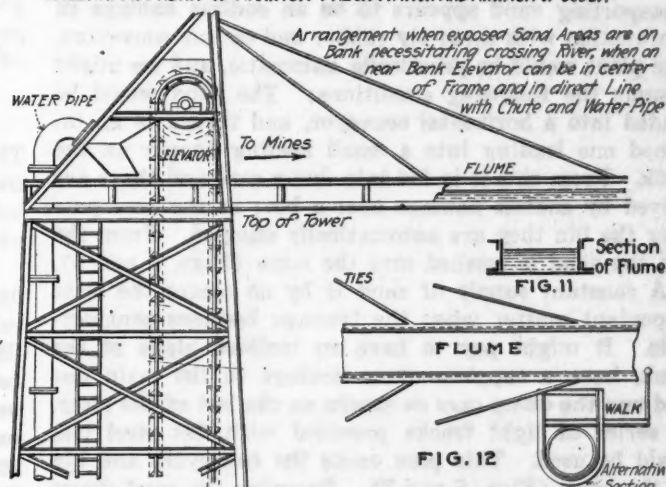


LONGITUDINAL SECTION OF RIVER WITH SUGGESTED EXCAVATION LEAVING SPILLWAYS TO ADMIT OF MAXIMUM PRECIPITATION AND MINIMUM OF SCOUR



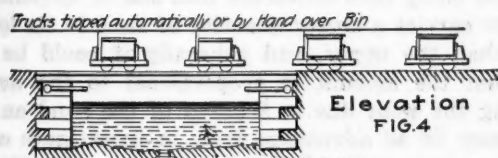
Plan FIG. 3

ARRANGEMENT OF SUPPLEMENTARY CONVEYOR



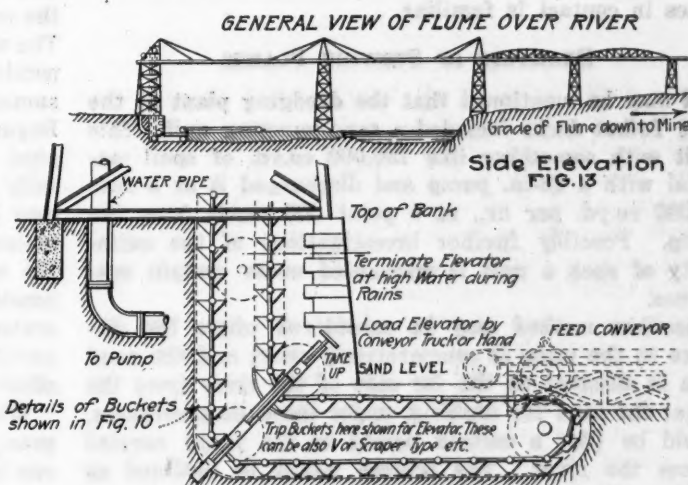
Elevation FIG. 10

BANK TOWER FOR FLUME



Plan FIG. 5

SAND RECEIVING BIN OVER MINE



Elevation FIG. 14

BASE OF TOWER FOR FLUME AND SAND FEED IN RIVER BED

ILLUSTRATIONS OF VARIOUS TYPES OF PLANT FOR HANDLING SAND FOR FEEDING INTO MINES IN INDIA. EXCAVATING AND CONVEYING MACHINERY FOR LOADING AND TRANSPORTING SAND FROM RIVER TO MINE

of more horizontal ones on the bed and the other running up the bank (see Figs. 1 and 2).

The maximum angle at which sand can be dealt with would be about 30 deg., although certain patent types and scraper conveyors will, of course, deal with much steeper gradients. The horizontal feed conveyors should preferably be entirely self-contained, driven by a motor and capable of being moved around in a semi-circle with the lower end of the inclined one as a pivot (Fig. 3). It would be necessary to fix it on rollers or skid plates to facilitate its circuitous movement, and it could be provided with a simple motor driving attachment for the purpose if necessary.

METHODS OF TRANSPORTING STOWING MATERIAL

A steam shovel is likely to prove too heavy for the purpose of loading and a conveyor appears to be the most suitable. Should an aerial gear be employed for the transportation line another type of gear might be profitably substituted.

Assuming the case of mines adjacent to the river, with possibly plenty of water, the simplest form of transporting sand appears to be an endless haulage in conjunction with three-ply rubber and canvas conveyors. The plant would be practically automatic, and we might assume the following conditions: The sand would be loaded into a horizontal conveyor, and thence to an inclined one leading into a small loading hopper on the bank. From this it is fed into dump cars and these are moved by endless haulage over a bin; as the cars pass over the bin they are automatically dumped. From the bin the sand is washed into the mine (Figs. 4 and 5).

A constant supply of sand is by no means the least important matter when the tonnage becomes considerable. It might pay to have an inclined plane at the bank, have a supplementary haulage to the main one and run the dump cars on tracks on the bed of the river. A series of light tracks provided with flat steel ties could be used. This plan omits the conveyors and bin at the bank (Figs. 6 and 7). Pumping the sand direct through a pipe line may be suggested; but it does not overcome any more successfully the problem of loading, while the effect of sand on anything with which it comes in contact is familiar.

EXAMPLES OF STOWING PLANTS

It may be mentioned that the dredging plant at the Port Talbot docks included a sand-pumping unit. This dealt with something like 150,000 cu.yd. of spoil material with a 22-in. pump and discharged it at a rate of 200 cu.yd. per hr., at a point 500 yards from the pump. Possibly further investigations of the suitability of such a unit is warranted under certain conditions.

Another method may be considered where the distance to the mine is comparatively short and the sand area is situated on the far side of the river from the mine; the sand for flushing, under these circumstances, would be (for a certain period of the year) carried across the river. The scheme might be outlined as follows (Figs. 10 to 14):

A tower might be set up at some point on the river bank most conveniently situated for sand excavation. A combined conveyor and elevator possibly could be arranged to run from the river sand deposit to the top of the tower, running horizontally in the river bed so as to facilitate loading. At certain times of the year

it could be shortened to avoid flood water and to enable the vertical section still to operate should sand be available. The elevator would discharge sand into a flume at a sufficient height above the receiving point at the mine to allow the material flushed with water to gravitate to the mine. The water for flushing would be pumped up a pipe supported by the same tower. The proposition would necessitate the use of a number of frames or intermediate towers to carry the flume at a suitable grade. The flume towers should be suitably braced to withstand wind pressure and the load, the former possibly proving the most serious consideration. There may be cases where it would prove more advantageous to employ a pipe in the place of the open flume, so that the head necessary to transport the sand may be reduced; this plan would allow water to enter the pipe under pressure, thus preventing the settlement of sand in transit.

The scheme shown in Figs. 10 to 14 would only necessitate power to drive the elevator and necessary pumps. Further, in order to produce the necessary scouring effect the usual proportion of water to sand might be greatly increased. Having completed its work of transporting the sand to the mine, the water could be drained off and led back to the pumps by means of another flume.

DETAILS OF HYDRAULIC FEATURES

Thus the water could be used over again. The sand could be allowed to settle in a bin adjacent to the borehole into the mine and the usual proportion of water added to carry it underground.

In considering a suitable coefficient of friction for flume troughs of various dimensions with varying velocities to suit conditions, it should be observed that the scouring power of a flow of water in an open channel does not at all times bear a direct relation to the velocity and depth. In other words, as the hydraulic radius is increased, it does not follow that in order for the water to impart motion to the sand the velocity of the water will increase proportionally.

The depth of flow is an important factor, as the water first subjects the sand to a motion of dragging, and later the particles are lifted up into the stream, the motion being then converted into one of suspension. The water carries a larger quantity of sand in its lower portion than the upper, and generally it could be assumed that the amount is proportional to the depth. Regarding the wear due to friction of the sand on the pipe, it may be an advantage later to investigate carefully the relationship of this to the velocity. For it may be assumed that in pipes the greater amount of material carried will be along the center portion of the water; it remains to be determined to what economical limit the velocity of the water may be accelerated in order to increase the time of suspension of the particles and reduce the friction due to the dragging effect of sand particles.

Where, however, the sand is washed into a bin and precipitated, while the water is allowed to overflow and run back to the pumps at the river bank, then the proportion of water to sand may be high so that the inclination of the flume or pipe line can be reduced. Further, at the feeding point the tower can be extended to a greater height so as to increase the head, and this would reduce the requisite height of the other towers in the case of a pipe line.

In the open flume it is doubtful whether a coefficient

of friction for sand on iron will be less than one-fifth. Thus, for water to carry 1 lb. of sand a distance of 100 ft. requires $100/5 = 20$ ft.-lb.; if the proportion of sand to water is 1 to 10, then 10 lb. of water must fall 2 ft. in 100 to give this energy. However, while the water imparts motion to the sand there is a tendency for the former to run at a higher velocity over the latter, so that the inclination of the flume should be more than 2 ft. in 100. Possibly for feeding the sand, in the place of the flume it would be better to employ a pipe, and we may then roughly assume that the grade will be in proportion to the mixture; if one part of sand be used to 25 of water the grade would be also in this proportion, or 4 ft. in 100. The necessary head might be increased at the feed tower, so as to reduce the height necessary for the intermediate towers. The flume bearing the return water to the pumps could be carried across the river (when necessary) below the supply pipe and on the same supports.

STOWING PLANT AT THE MINE

The area of the receiving bin would in this case have to be of sufficient extent to admit of the requisite precipitation of the sand with sufficient rapidity to allow a large proportion of the water to overflow. For this reason the bin might be provided with a well in its floor and the surface graded to meet this, so that an adequate sand sump would be provided. The feeding pipe from the river should terminate at a comparatively deep point in the bin so as to keep the sand at as low a level as possible to aid its precipitation; from the bottom of the well the sand could be led straight to the mine or a supplementary feeding bin. The flume for taking back the surplus water should emerge from a point near the surface-level of the feed bin. A strainer might be put at the entrance of the flume to assist in keeping out the sand. It might be convenient to have this flume follow directly under the supply pipe though possibly set on the ground until it reaches the river when it can be carried across the stream to the pumps on the same support as the upper pipe. Owing to the low grade required for the return water, it is possible that this flume could meet the feed tower at a point considerably above the level of the river. Thus pumps could be situated at this higher elevation and reduce most of the expense of pumping water from the river below.

It is of course doubtful if this project would always prove economical or convenient. But it is possibly worth consideration, particularly where the location of the sand areas necessitates crossing a river which may need bridging for a good portion of the year. This is a case where the mine is comparatively adjacent to the sand area. In the Jharia field the river is generally at a distance from the mines, and the problem involves considerable capital. This problem may be solved either by the coöperation of a number of collieries or the construction and operation of the main transportation line by a private company.

For transporting the sand, endless haulage appears the most suitable. With this system, if we have a four-mile transportation line and assume each car carries one ton at a speed of two miles per hour, then one car takes two hours to make the round trip. For the sake of illustration we may assume that we have to transport 5000 tons per day of 12 hours, equal to, say, 416 tons per hour. This means 832 full cars and 832 empty

ones in transit, or a total of 1664 plus those being loaded at the river bed. Possibly not less than a total of 1800 cars will be employed. Five thousand tons daily means 11,200,000 lb., and at 100 lb. per cu.ft. this equals 112,000 cu.ft. A simple method of loading would be by running the cars on a series of portable tracks as occasion required. The loading, however, would be a difficult problem as a loaded car would have to leave every eight seconds; and if we consider the sand is excavated to a depth of 2 ft., then every day an area equal to 56,000 sq.ft. will be cleared. Therefore, a simple loading device becomes absolutely necessary, the simplest method being to employ a conveyor, which by reason of its length is particularly adapted to work of this kind.

In America sand is often excavated and loaded by portable machines consisting of a frame with a number of buckets fixed to an endless chain running over both head and tail wheels. The buckets are about 18 x 18 in. in cross-section, and the apparatus delivers about one ton per minute. The machine is equipped with a chute and only requires about a 7-hp. motor to drive it, the weight with the motor being about 7000 lb. About eight of these machines would possibly help to solve the difficulty of labor trouble with regard to loading and prove more economical. The excavators at the river bed would then feed into a conveyor, and from experiments it is found that one man can load a conveyor with 6.75 cu.ft. of sand in 12 minutes with the material at a distance of 18 ft. from the conveyor. In practice the conveyor could possibly be moved in such a way that the men would be close to it all the time, and would at the most have to carry the sand about 3 ft. In the condition under review it was found that the 6.75 cu.ft. actually were deposited in the conveyor in 12 minutes, as noted. This represents 675 lb. in 12 minutes, or 1.6 tons per hour.

With a conveyor 500 ft. long and a man every 3 ft., 166 men could be employed each side of the conveyor, and these could load about 500 tons per hour; but for the purpose of calculation it would be advisable to figure on not less than 400 men.

PRACTICAL CONSIDERATIONS AFFECTING PLANT

Assuming the conveyor could be moved practically in a circle, we get a superficial area of 783,828 sq.ft.; or excavating to a depth of 2 ft., we would have about 1,567,656 cu.ft., equaling about 70,000 tons, or 14 days' supply. This conveyor then would feed into another one leading up the bank, the latter being 600 ft. long. Since the loading point at the bank is being continually shifted from the bank terminal of the main transportation system, a supplementary haulage would have to be introduced running parallel and close to the bank; a portable bin would have to be provided into which the conveyor running up the bank would feed. As the area was evacuated in the river bed, and the conveyors were shifted, the bin would be moved from time to time to suit conditions. Owing to conveyors being more expensive than a track, the former is not to be recommended for feeding direct to the main haulage. The loading bin would have a capacity of about 100 tons (or 2,240 cu.ft.) and if it was 40 ft. long, would accommodate eight trucks at a time; this would enable loading at the speed required to allow them to leave at their eight-second intervals.

In Jharia, the point for depositing the sand from the

main transportation line would be about 80 ft. higher than the river bank, the grade being 1 in 230 or a pitch of 0 deg. 16 min. The load on the rope equals 832 tons; to handle this load a 1-in. rope may be used weighing, say, 5 lb. per yd. It will possibly be advisable to have a central power station which could either be situated at the river bank, thus saving the poles and wiring to the conveyor motors; or we may assume a power unit with sufficient power to operate, in conjunction with the main transportation line, and endless haulages in mines adjacent to it. The latter is the more expensive arrangement, but is used, as the grade to the mines is favorable to the load, as a rule.

The Amsterdam Mine Disaster

BY SPECIAL CORRESPONDENCE

At 9 a. m., Oct. 29, 1919, the new mine of the Youghiogheny & Ohio Coal Co., Amsterdam Mine No. 2, Amsterdam, Ohio, was the scene of the greatest mine disaster in the history of Ohio coal mining. With a death toll of 20 lives and a property loss of thousands of dollars, Amsterdam Mines Nos. 1 and 2 are sealed in an attempt to smother a fire which has been described by experienced mining men as one of the worst ever known.

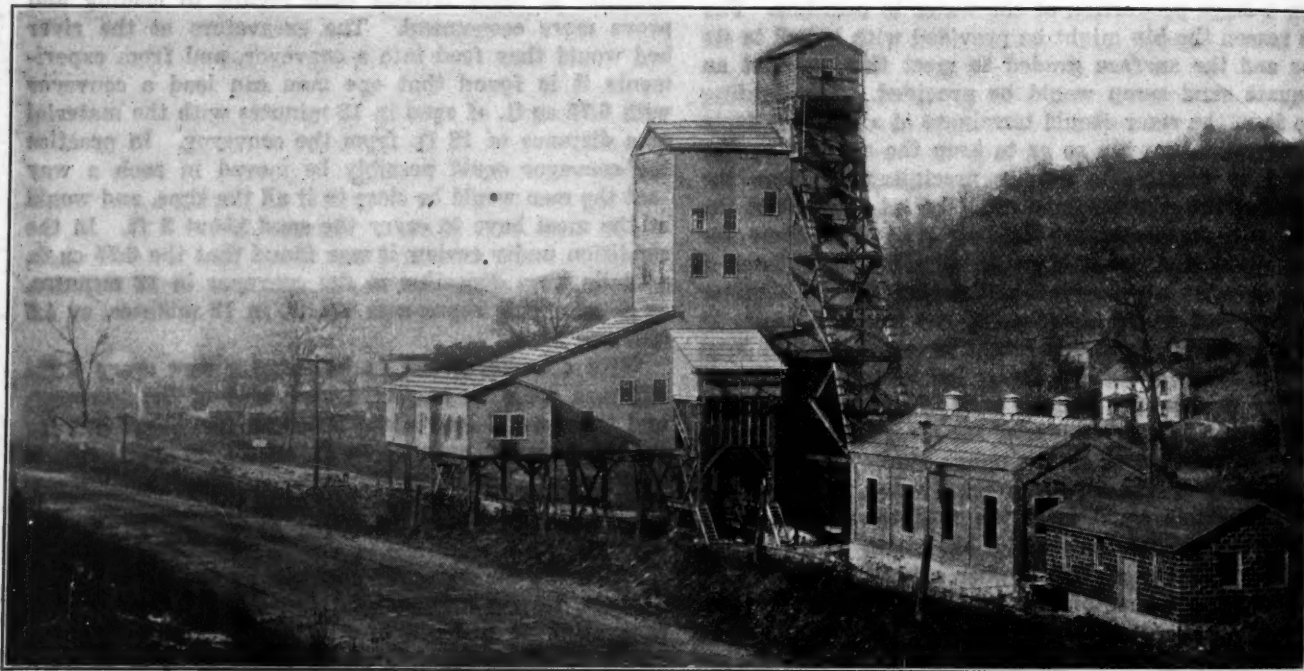
to. At 4:30 p. m. one engine arrived and at 5 p. m. two streams of water—700 gal. per minute—were playing on the fire.

Numerous attempts were made from time to time to reach the entombed men who were trapped in 14 and 15 West Butt Entries, but as no rescue apparatus of any description was at hand, no progress was made.

The Ohio State rescue car arrived at 10 p. m., Oct. 29, from Columbus, Ohio, in charge of Chief Mine Inspector Jerome Watson. On Oct. 30, the United States Bureau of Mines car, which was stationed at Brownsville and in charge of William German, arrived. At 6 p. m. of the same day United States Bureau of Mines car, No. 9, arrived from Illinois. Organized attempts were made to reach the trapped miners, but on account of the dense smoke and gas, little progress was made until means had been provided to throw a current of fresh air into 14 and 15 West Butts.

The body of the first man was discovered in 14 West at 8 p. m., Oct. 31, 59 hours after the fire started. The body of the second man was found a short distance from that of the first one, two hours later. The bodies of the other 18 men were found at 2:10 p. m., 79 hours after the start of the fire. They had made a futile attempt to seal themselves away from the smoke and fumes in No. 2 room in 15 West Butt Entry.

The pumping engine of the Steubenville Fire Department



TIPPLE AND HOIST-HOUSE OF THE NO. 2 MINE AT AMSTERDAM, OHIO.

Amsterdam Mine No. 2 was ventilated by a steam-driven fan located at No. 1 mine. This fan being too small to furnish ventilation for both mines, two booster fans driven by electric motors, were installed at No. 2 mine. One of these fans was located in No. 3 North Quartering Entry, 400 ft. from the main hoisting shaft where the fire started.

It is alleged that quite an accumulation of inflammable material, such as oily waste and hay, had been allowed to collect around this fan and motor. It seems that when this fire started, either from a hot bearing or an electric spark, the attendant in charge had absented himself for a few minutes. Due to the velocity of air at this point, the fire soon gained uncontrollable proportions.

As soon as the fire was discovered an attempt was made to extinguish the flames with buckets. This method was soon abandoned. Two 2-in. pipe lines were then laid, but on account of inadequate pumping facilities, and the steadily increasing size of the fire, the Steubenville Fire Department was appealed

broke down at 2 p. m., Nov. 1, after a continuous run of about 70 hours. At this time the fire was thought to be under control and the engine was returned to Steubenville.

An attempt was made for several days to clean up a large fall at the scene of the fire, also to drown out what fire that was thought to remain. Later it was discovered that the flames had spread over a large area. It was then unanimously decided by the officials in charge that the mines would have to be sealed, and this was done, Nov. 12 and 13.

Space does not permit accounts of the splendid individual heroism of the rescue men who worked to the point of exhaustion in water waist deep, men squeezed their way over tops of falls through foot high apertures. They worked for minutes at a time in smoke and fumes where a safety lamp would not burn, and at all times faced the menace of an explosion due to an accumulation of gas in the working places, which continually worked toward the shaft bottom.

Present Fuel Supply From an Engineering Standpoint*

BY H. M. CHANCE
Philadelphia, Penna.

IN discussing coal supply from an engineering standpoint, I will not attempt to analyze the conditions bearing upon the supply of anthracite. Anthracite is a relatively small factor in power production except in eastern New York, eastern Pennsylvania and New Jersey. Under normal conditions over 60 per cent. of our anthracite output is sold for domestic use, and it should so far as is possible be conserved for such use. The total output of anthracite is less than 15 per cent. of the total coal mined in the United States.

Coal Age estimated the output for 1918 as follows:

	Short Tons
Anthracite, total output	99,514,334
Used at the mines	9,061,591
Shipments	90,452,743
Bituminous Coal (including coal used at the mines)	590,137,776
	680,590,519

The predominating importance of soft coal as a steam coal is therefore apparent.

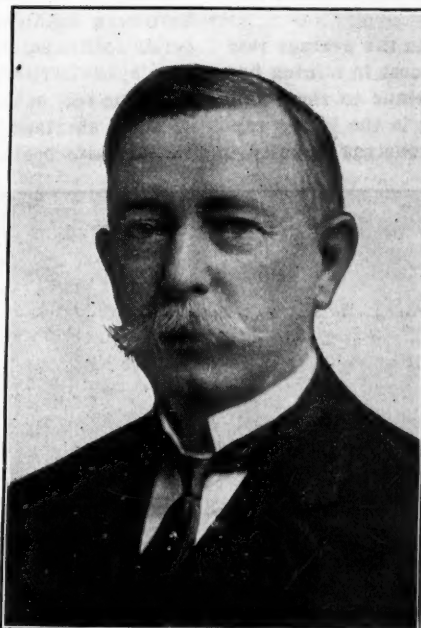
As it is impossible to anticipate the conditions as to fuel supply with which our posterity may have to deal, I shall limit my remarks to the present and immediate future outlook and to those issues which are of greatest interest to engineers and to the consumers whom they serve; namely, to cost, quality and supply.

Will the cost of fuel coal increase or decrease? Will the several qualities or classes of coal be adequate to meet the demand for the several grades? Will the supply of coal of all grades be sufficient to prevent periodic fuel famines? These questions involve matters so closely interwoven one with the other that they cannot be discussed separately, for all of the factors that affect the mining industry have direct or indirect bearing upon each of the issues.

I shall not attempt to discuss the present or future varying costs of transportation, nor the effect of adequate or insufficient transportation service upon the supply, except in so far as these react upon the ability of the operator to mine a maximum tonnage at minimum cost.

ABUNDANT RESOURCES

We are all doubtless fully convinced that in the United States east of the Mississippi River are coal resources sufficient to meet all of our possible requirements for many generations, this having been proved by the work of our State and National Geological Surveys. The Appalachian coal field extends as an unbroken and continuous region from western Pennsylvania and eastern Ohio through Maryland, West Virginia, eastern Virginia, eastern Kentucky and Tennessee, and northwestern Georgia to Alabama; and our Central coal field extends from western Indiana over a large portion of central and southern Illinois southwardly to the western part of Kentucky and westwardly includes large areas in Iowa, Missouri, Kansas, Arkansas, Oklahoma and Texas, with a disconnected district of considerable size in Central Michigan. These coal fields contain all kinds and grades of bituminous coal



H. M. CHANCE

and also include relatively small areas of coal classed as semi-bituminous and semi-anthracite. Most of these coals are true bituminous coals; that is, they have a relatively high percentage of volatile combustible matter and have caking or coking properties, but only a relatively small percentage of these total reserves will make strong coke of a quality suitable for use in iron smelting. All of these coals are available as fuels for power production, but their value for this purpose as measured in B.t.u. (British thermal units) varies all the way from very low grade coals of 8,000 to 9,000 B.t.u. value up to coals varying from 14,000 to 15,000 B.t.u. value.

A small fractional part of this vast supply consists of strictly high-grade coal—that is, coal with low percentages of ash, of water (moisture) and of sulphur—existing in coal beds close enough to the surface and of sufficient thickness to be mined at reasonably low cost. This is coal the fuel value of which is rated in excess of 14,000 B.t.u.

Possibly less than 1 per cent. of our total coal resources consists of this high-grade cheaply mined coal, and of this relatively small quantity only a fractional part is of the refractory ash type, which enables the engineer to use it for forced firing of boilers up to 250 per cent. of their rating.

The readily accessible reserves of coal of this type are being depleted rapidly; no large areas of such coal are in reserve, and with increasing demand the premium commanded by coals of this grade is steadily rising.

By designing and encouraging the building of power plants requiring for their efficient operation coals of this type, engineers are in part responsible for accentuating this difficulty. It seems to me that the time has come when engineers should direct their attention to the development of types of plants designed to utilize coals of lower grade, not only to avoid the steadily rising premium on the high-grade coals but also to conserve these supplies of high-grade fuel for marine and metallurgical uses. We have every reason to believe that the premium commanded by high-grade coals of this class will steadily advance and that it will not be long before plants that are not designed to use fuels of medium grade will be operated only at largely increased cost.

USE OF MEDIUM GRADE COALS

In the East most of our power must be produced by coals of medium (or second) grade, ranging in fuel value from about 12,500 up to 14,000 (or a little more) B.t.u. Of these we have an abundant available supply, and we need not fear that the price of these coals will advance because the deposits are insufficient or inaccessible. In the regions west of Ohio (excepting Arkansas and Oklahoma) the coals are generally of lower (or third) grade and the local (and cheap) supply for power production is limited to coals having a fuel value of from about 10,000 to 12,500 B.t.u.

As necessity is the mother of invention, engineers have striven to develop methods of cheap power production for

*Address delivered at a luncheon of the Engineers' Club of Philadelphia, Nov. 4, 1919.

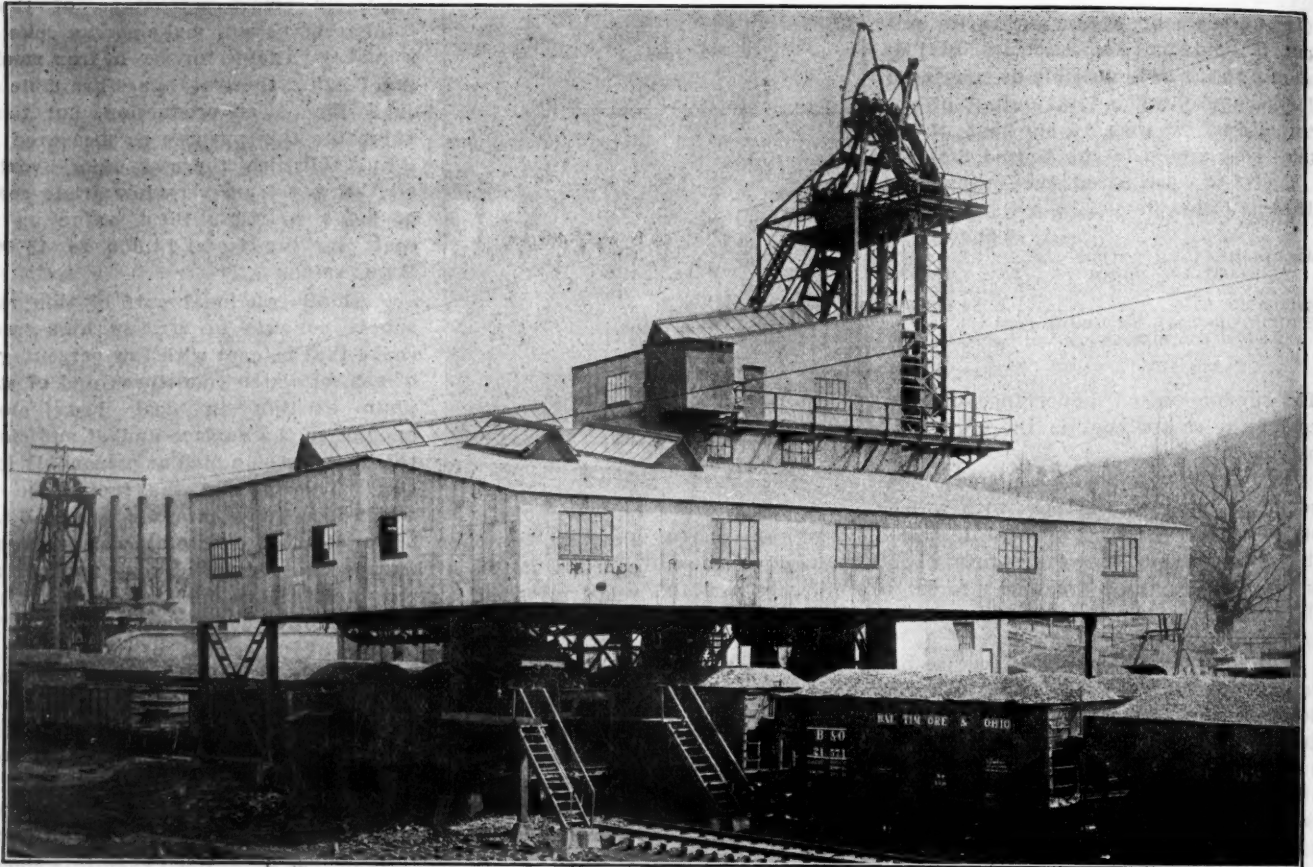
utilizing low-grade coals in the regions west of Ohio and have been working out improvements in plant design that will doubtless find many useful applications in the utilization of our medium grade coals here in the East.

Now as to conditions affecting cost at the mines, and when I say mines, I use the word to mean mines operating under average conditions, we may say that from 65 to 75 per cent. of the cost of mining coal is the labor cost. The balance is made up of the cost of materials, wear and tear, depreciation and miscellaneous overhead charges.

Irrespective of any fundamental changes in the average rate of wages paid in other industries, the labor cost in mining has been steadily rising and doubtless will continue to rise. One of the causes contributing to increased cost is the larger capital investment necessary for improved housing, casualty in-

to the effect of the profit of the mine operator upon the cost to the consumer. I believe that the profit of the mine operator in the future will be more than in the past. I do not say "greater" or "larger," because the profit in the past has been neither "great" nor "large," but has been ridiculously small. No other large industry has earned such totally inadequate returns upon the invested capital, amounting to so small an interest rate that I hesitate to express it in figures.

Many of the individuals and corporations that in the past have been financially successful in coal mining owe their prosperity to increase in the value of coal land (purchased as undeveloped territory at low cost) and not to profits derived from the sale of coal. However, competition, except in periods of acute shortage, will prevent material increase in cost from an excessive profit demanded by the mine operator. The mine



TIPPLE AT MINE NO. 87 OF CONSOLIDATION COAL CO., AT IDA MAY, W. VA.

insurance and many requirements that come with increasing expansion of the workings to greater depth, greater length of underground haul, increased cost of ventilation and other elements important in large operations but that could be disregarded in mines opened at and working near the outcrop of the coal.

As engineers, or as consumers of coal for power purposes, it would not, in my judgment, be wise for us to base any projects upon an assumption that the cost of producing coal at the mines will in the near future be appreciably less than at present, but on the contrary I believe it would be well to have in mind the possibility, or the probability of increase rather than of decrease in the average cost of mining.

PROFIT OF MINE OPERATOR

The price to the consumer will of course be the cost of mining, plus the profit of the mine operator, the selling cost and the cost of transportation.

I shall not attempt to say anything about freight rates as affecting the cost to the consumer, or about the cost of selling the coal, but I am perhaps competent to express an opinion as

operator is beset with difficulties realized by few who are not personally in touch with mine operation, and these difficulties inevitably increase the cost of mining.

Having developed and equipped a mine with a daily capacity of, say, 1,000 tons per day, having built houses and secured miners to mine this quantity, the operator can mine only when an adequate car supply enables him to operate. He cannot mine the coal and store it for subsequent shipment. If the railroad cars are not furnished or the allotment is insufficient, his mine is idle for the day or a part of the day. If his sales agent fails to sell the coal his mine is idle, and the railroad cuts down his allotment of cars. If his daily output is appreciably less than his equipped capacity, his mining costs per ton rise rapidly. If the miners, owing to lack of orders or insufficient or irregular car supply are unable to work enough days per week to earn satisfactory wages, they drift away to other mines, and his ability to get out coal is reduced, his railroad car allowance is cut down, his mining costs rise above the price at which his coal has been sold and he is soon bankrupt.

Courtesy of Mutual Magazine

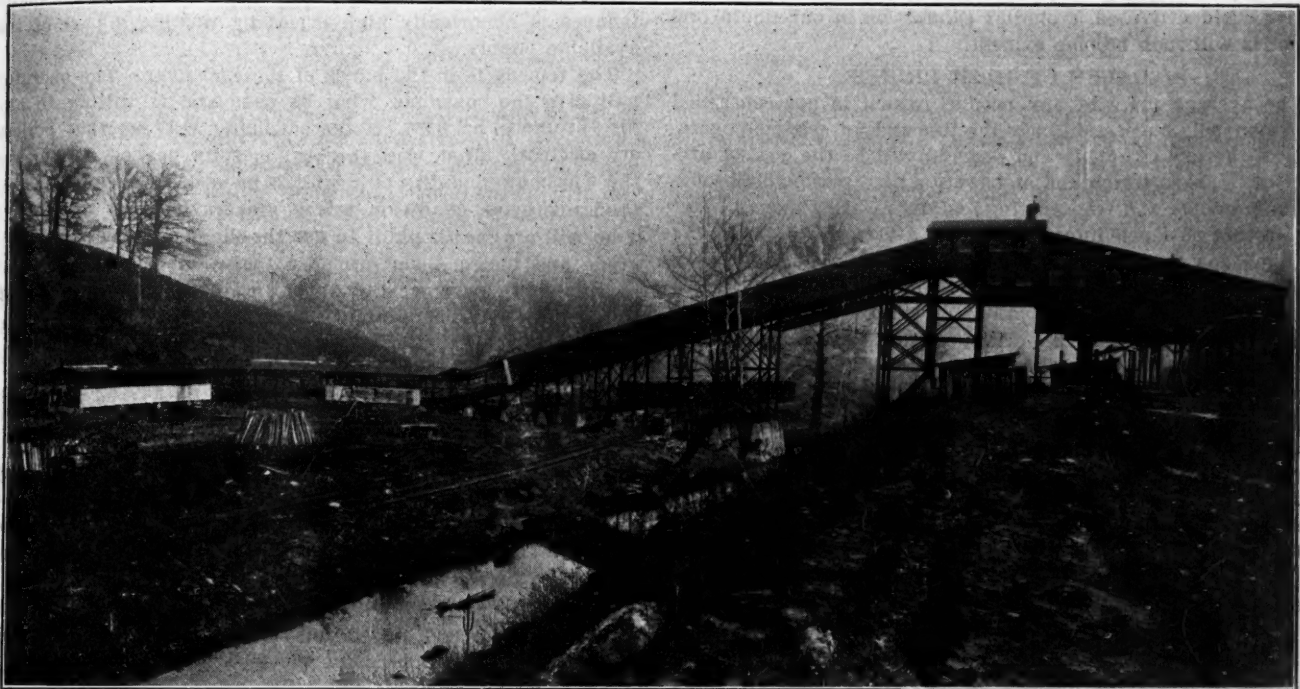
Most coal beds contain layers, commonly called "partings," of slate or rock or fireclay, which may or may not be sulphurous. It has been the practice in many districts to require the miner to remove most of this material from the coal when loading it underground, but when coal shortage requires work under high pressure this cannot be done, and the operator has found it necessary either to ship the coal as mined, or to have these impurities picked out after the coal comes out of the mine. This is slow and expensive and cannot be done thoroughly unless the coal tipples are rebuilt and picking tables installed. This has now been done at many mines, and I do not doubt that picking tables and washers for the proper preparation of the coal will come into general use.

PREPARATION OF COAL

Engineers can help to bring about a general improvement in methods by insisting upon proper preparation, and by refusing to purchase excepting under a form of contract providing for

not attempt to say anything about the car supply or transportation problems, but a few words as to the mine labor situation will properly be within the limits of this discussion.

Serious reduction in our coal output may at any time be caused by shortage in mine labor, this term being used to include the miner as well as the laborer who works as his helper. In the readjustments brought about by the war, many miners have found their way into other occupations and will not return to the mines. They cannot be replaced by inexperienced labor, because a man can become an efficient miner only after some form of apprenticeship, usually as laborer or helper, extending over a considerable period. Further, the supply of mine laborers available for this purpose has also been seriously reduced and with no immediate promise of any large increase in this class of labor. If the available miners and laborers are kept steadily at work, as they can be if consumers contract for their supplies in advance and if the railroads



TIPPLE AT MINES NO. 88, 89 AND 90 OF THE CONSOLIDATION COAL CO. IN W. VA.

Courtesy of Mutual Magazine

the delivery of properly prepared coal and providing definite deductions in price on all coal that is not up to specifications.

THE BUYER OF "CHEAP" COAL

Many of the troubles of the consumer of coal for power production can be attributed to the tendency on the part of many purchasing agents to buy from the lowest bidder and to accept at their face value the statements of sales agents as to the grade and quality of coal to be furnished. The conscientious mine operator is discouraged in his efforts to ship properly prepared coal to his customers if he finds that other operators are obtaining the same price for coal that is shipped as mined and without preparation.

While it may be beyond the power of the engineer to have the coal inspected prior to shipment from the mines, it is entirely within his power to provide specifications that will insure payment, at full prices, only for coal properly prepared, and to see that the coal is inspected and tested as received.

SHORTAGE

And now as to shortage in the supply. No shortage in the supply of coal need be feared because there are not enough mines opened and equipped to produce enough to meet any possible increase in the demand. We have the coal, the mines and the equipment, but we cannot be sure of either labor supply or car supply or motive power to move the product. I will

furnish regular and sufficient car service, the number available is probably sufficient to produce an output that will meet the requirements; but if consumers do not place contracts for regular delivery far in advance of their immediate needs, or if the railroads fail to furnish a regular and full supply of cars, then it seems to me there will be a more or less serious shortage in the supply, and this condition may be more pronounced in the future than in the immediate present.

PRICE OF COAL

I do not believe the price of coal would decline to a pre-war basis even if the cost of living were to fall to a low level and a corresponding drop should occur in the average wage scale. In the past we have obtained cheap coal by the intensive working of the best, thickest, most easily accessible and cheaply mined coal beds. The quantity of coal now required to meet the demand can only be had by mining from the thinner coal beds and from those not so easily accessible nor so cheaply worked.

For these reasons it seems to me that no large or rapid decline in the price of coal is likely to occur unless, as a result of financial panic or industrial depression, the consumption should become much less than the output. On the other hand, an actual or prospective shortage may at any time cause the price to advance sharply, but temporarily, and when this oc-

curs those who have not contracted for their supplies in advance will naturally be those who will suffer most.

It seems probable, if not certain, that for a few years at least fuel oil will compete with coal as a steam fuel, especially in large consuming centers along the Atlantic Coast, and will possibly displace several million tons of coal now annually used for power production. As the quantity of oil available for such use is, as compared with coal, relatively small, this competition is not likely to bring about a material reduction in the average price of steam coal.

The use of so-called fuel oils for this purpose is from an engineering standpoint deplorable, because these oils should be conserved for marine use either under the boilers or steamships or for direct power production by internal combustion engines. Attention has already been invited to the use of high-grade coals, especially the so-called "smokeless coals," as steam fuels, and to the early exhaustion of our coal beds furnishing coal of this grade; and if our available fuel oils are to be improvidently used, a similar exhaustion of our liquid fuel supplies will soon become evident.

CAUSE OF HIGH PRICES

The average price of any product which is not controlled as a monopoly but is subject to the free and unrestricted operation of the law of supply and demand will be the cost of production, transportation and distribution plus reasonable profits to the producer and transporting and distributing agents. But we are not so much interested in the average price as in the high and low peaks shown by the price chart. The high peaks threaten the prosperity of the community and the low peaks bring bankruptcy to the operator. Neither party finds any consolation in the assurance of the political economist that the operation of the law of supply and demand will bring about a proper readjustment, for while ultimately this may be true, it promises no immediate relief. High coal prices naturally result from high cost of production (transportation) and distribution. Excessively high prices are usually due to an excess in the demand over the available supply—that is, to shortage in the supply.

Political economists long ago accepted as axioms that with increasing demand or decreasing supply prices rise, and with decreasing demand or increasing supply prices fall, but they have not been able to give us any measure of the percentage of rise or fall in price that will follow a certain increase or decrease in either the demand or supply. A relatively small shortage, say 5 per cent., may cause the price to double or triple, and conversely a relatively small surplus may cut the market price in half.

THE VICIOUS CIRCLE

During 1916, 1917 and 1918, when bituminous coal at times sold for from \$4 to \$6 per ton at the mines, we had examples of how a relatively small shortage will quickly double the price. The actual shortage during the worst period was estimated at about 5 per cent., and was principally due to railroad car shortage or to motive power shortage. During this period it has been estimated that an excess of 5 per cent. above the normal quantity of refuse (slate, fireclay, rock) was shipped with the coal. If these figures are correct, it is evident that had the coal been properly prepared, the quantity transported by the railroads would have been equal to the demand, there would have been no shortage and the abnormal jump in prices from \$2 or \$3 up to \$4 to \$6 would not have occurred. Under these conditions the consumer, while paying twice the price for his coal, was getting coal that was worth as a steam fuel only 90 to 95 per cent. of the value of properly prepared coal, and he was therefore forced to increase the quantity ordered from 5 to 10 per cent. or more to keep his plant running, thus adding an increased demand to the already deficient supply.

CAUSES AND REMEDIES

Every consumer who fails to insist on proper preparation of the coal or who is unwilling to pay a reasonably larger price

for the better prepared fuel forms a segment of the "vicious circle" which constitutes the basis underlying abnormal prices and periodic shortages in the supply.

Every operator who fails to properly prepare his coal for shipment, or who does not insist on reasonable compensation for the cost of preparation, contributes to the demoralization that results from abnormal fluctuations in price due to periodic shortage in the supply.

Every power plant that requires especially high-grade coal of the smokeless type for its efficient operation is another unit tending to increase the average cost of coal at all power plants.

Every ton of refuse hauled to the consumer with his coal involves the absolute waste of cost of power, wear and tear, interest on equipment, and proportionate overhead expense of operating the railroads over which it is transported.

Every boiler plant that operates inefficiently and every prime mover using steam inefficiently contributes to the maintenance of abnormally high prices by wasting a part of the available supply.

The remedy is in the hands of the consumer. The operator will give the consumer what he asks and is willing to pay for—no more, no less. If the consumer will see that boilers are efficiently fired, that the coal is fully burned and makes the maximum quantity of steam; if he will install and keep in good operative condition prime movers of high efficiency; if he will arrange his plant to use the cheaper coals of medium grade and insists upon proper preparation of the coal prior to shipment, many of the difficulties of present and future fuel supply will disappear.

Vienna is Pinched by Lack of Coal

The Vienna authorities announce that they are unable to issue the meager seven kilograms of about fifteen lb. of coal for each household weekly, which was recently promised. Thus the fuel situation grows worse and the failure of the owners of the forests near Vienna to fulfill their old contracts because of the depreciation in the value of the crown aggravates conditions. The government apparently is helpless.

A subcommission of the reparations commission is investigating the food and fuel problem, and the press and people pin their hope on its recommendations.

The movement of export coal has touched a low point, and unless there is a speeding up in production the foreign trade that has been built up by this country in coal is likely to lose its strong position.

Regarding the coal situation abroad advices have recently been received here in connection with the fuel supplies in France. It is reported that there is not so much lack of coal for domestic purposes, but a lack of coal for transport and industrial undertakings. The Pas-de-Calais mines, according to one French journal, in Oct., 1917, produced 42,000 tons per day and in Sept., 1919, the production fell to 23,000 tons daily. The mines of the Nord, which produced 6,813,761 tons for the year 1913, produced 1,500 tons for Jan. this year, though it is hoped that the yield for Nov. will be 100,000 tons. It is also estimated that the coal imported to the Department of the Nord has decreased by 38 per cent since 1914 and that prices of imported coal have risen by 337 per cent.

Miner's Strike Affects Italy's Supply of Coal

Italy's supply of coal, which will be scarcely 700,000 tons in November, will be even less in December owing to the recent strike of bituminous miners in America. While Italy never received promised German coal to Belgium and France, it is hoped she may get a larger quantity from England as a result of increased production there.

American Mining Congress Holds Session

By R. DAWSON HALL

Managing Editor, Coal Age.

WITH your coal operators busily in conference with the mine workers at Washington and your senatorial co-operators battling in their chamber on no less a matter than the League of Nations, what hope has your energetic secretary that he will have a good Mining Congress? James F. Callbreath, with the Executive Committee, that controls the organization of which he is secretary, little thought, when he put the date on his schedule, that everything would conspire against him to make the Congress a failure.

But it was not the Congress, but the conspiracy, that failed. There was a splendid attendance of about 1200, a more than ordinarily good exposition, and better speakers than ever before. The imagination is set working to wonder what kind of a Congress, Bulkeley Wells, the president, and James F. Callbreath, the secretary, would have staged if the miners had kept their contract and the senators signed the treaty, for the American Mining Congress is now grown into full manhood. Its years attest that fact no less clearly than its finances. It has ventured to ask 10 cents for every \$1000 of output—a voluntary contribution, but one that seems quite generally paid. No Congress or other institution can succeed that does not boldly face the question of finance by some such measure of taxation as that which the Congress has taken.

The twenty-second annual convention of the American Mining Congress assembled at 2:30 p. m., Monday, Nov. 17, in the Convention Hall of the Exposition Building, an edifice which in earlier years was known as the Southern Hotel. Robert E. Lee, the grandson of the veteran commander of the Southern Armies during the Civil War, presided in the absence of Thomas T. Brewster who, though a St. Louisan, could not be present as he was busy fighting for the public in the wage conferences at Washington. D. C. Mayor Henry W. Kiel, who was expected to be present, could not perform the duties of host, owing to sickness, and W. K. Kavanaugh, chairman of the Exposition, had to absent himself because the coal-strike negotiations in Washington made his absence imperative.

SOME INTERESTING ADDRESSES MADE

The address of welcome was made by Xenophon P. Wilfey, former United States Senator, a resident of St. Louis. He urged greater production and commended President Lewis of the United Mine Workers of America for courageously saying that the strike of the mine workers must be called off because the courts of the United States had so ordered. No institution, declared the ex-senator, could be allowed for one moment to set itself in opposition to the Government of the United States.

President Wells in his reply to the address of welcome denounced the activities of the Industrial Workers of the World, especially expressing his abhorrence of the Reds at Centralia, Wash., for their dastardly murder of former service men when these men were passing in a parade in honor of Armistice Day. He favored compulsory arbitration, commended collective bargaining and the eight-hour day as fair both to employer and employee.

He did not speak so favorably as to profit sharing because, in his belief, labor was willing to travel along with industry in its periods of affluence but was not ready to accept the unpleasant descent into the period of decreased prosperity. It was willing to share with enthusiasm the gains of capital, but would not share with it any of the losses of lean years.

He recommended the formation of an industrial commission that would take jurisdiction when strikes occurred and have

power to enforce its decrees on both parties, employers and employed alike.

Elmer Donnell, a St. Louisan, general manager of the Associated Industries of Missouri, who represented Arthur J. Davis, the president of that organization, who was ill, said: "We are ready to fight to the last ditch against those radical interests which would defy law, overturn the Government, wreck our institutions and destroy industries."

Dr. Van H. Manning, Director of the United States Bureau of Mines, as personal representative of Franklin K. Lane, the Secretary of the Interior, drew attention to the fact that the coal mines of the United States stand idle between one-fourth and one-third of each year, with consequent hardships on the mine workers and great loss to the operators and the public.

He recommended the establishment by the government of winter and summer rates on coal, the summer rates to be materially lower than the winter in order to induce industries and individuals to purchase and store their coal in summer and thus keep the mines going full blast the year through.

Winter and summer prices, or a sliding scale of coal rates, he said, would keep the miners busy, maintain a regular flow of coal, and keep the public supplied at reasonable prices.

EXPORTS WILL BENEFIT THE INDUSTRY

A good export trade, Dr. Manning said, would greatly benefit the coal industry of the United States. He added that the coal exports from this country had grown enormously since the war, due to the shorter hours obtained by miners in Great Britain, which curtailed the production of that country.

He advocated that the coal-export business from the United States be placed upon a firm basis, through its own shipping facilities, so that coal produced here could be enabled to compete with coal mined in other countries. Dr. Manning said that owing to high freight rates, demurrage, insurance, etc., American coal sells at prices as high as \$35 a ton in France. Of this charge, he said, 90 per cent is required for transportation, insurance, demurrage and charges incident to shipping, and only 10 per cent for production.

He advocated the creation of a coal-export corporation under the provisions of the Webb-Pomerene law to handle for operators all shipments of coal. By this method coal unsuited for foreign uses will not be shipped to the detriment of the American coal trade. The prices of transportation, etc., he thought, might be better regulated than they are at present.

He deplored the tendencies of the various countries to exclude foreign capital from engaging in the exploitation of mineral resources, declaring this policy to be short-sighted and likely to lead to international complications. He urged the Mining Congress to support a policy of reciprocity that "will place our citizens upon a parity with other nationals in the exploitation of the universal resources of the world."

He said that it had always been the policy of America to encourage foreign capital to enter freely and that the United States had permitted foreign companies to acquire holdings here on the same footing as citizens of this country. He said he believed in that policy.

Dr. Manning said further that the use of oil as fuel in competition with coal should be discouraged, because the thermal efficiency obtained in the average steam plant is but 10 to 15 per cent, while in internal-combustion engines an efficiency of from 30 to 36 per cent can be obtained.

He declared that the development of oil shales to supplement the oil wells when their supply begins to decrease is a

problem of first magnitude for the congress to consider. At the close of his address Dr. Manning declared the exposition open.

In the evening, under the chairmanship of Bulkeley Wells, a meeting to discuss the railroad situation was held. Alba B. Johnson, formerly president of the Baldwin Locomotive Works, and now president of the Railway Business Association, who represented the Co-operative Committee on Railway Legislation, urged that the Congress should interest itself in the railroad situation, for the mining industry furnished 58 per cent of all the freight traffic of the United States and so was vitally interested in the financial abilities of the railroads.

He freely admitted that reprehensible acts had, in the past, been committed by railroad corporations, but he pointed out that if railroads had taken bribes, the public had paid them. The public should bear half the onus of the evil of which the railroads are accused. Where a railroad has done wrong, a section of the public has been party to that wrong and cannot therefore point accusingly at the railroad that merely participated with it in that wrongdoing.

MANY PLANS ARE HATCHED

There had been 36 plans of railroad control put forward by nine separate groups. The Railway Business Association has no plans for railroad regulation, but it has certain principles which it wants borne in mind in the making of the settlement. The United States Chamber of Commerce distributed Referendum No. 28 requesting that replies be returned by July 24. Since that date the Chamber has been silent. Apparently it is not actively committing itself to any plan. H. H. Merritt is the president of the Co-operative Committee on Railway Legislation. That body has no miners in its personnel, but it would be pleased to take note of the views of the mining industry.

It was interesting, he said, to note that after all the investigation and all the aspersions of the public the Railway Valuation Board had so far found few over-capitalized railways where its work is complete and many railways which are immensely undervalued. Drastic reorganizations and what is quite aptly termed "the ploughing in of capital" have caused values in many cases to exceed capitalization.

The time has more than come therefore for the public to take a more generous view of the railroads' claims to adequate returns and fair freight rates. There are two bills providing for the return of the railroads: the Cummings' bill in the Senate and the Esch bill in the House.

The latter enables large railroads to affiliate with small, cuts out piratical competition that has in the past ruined railroads, demands that the issuance of securities shall be under federal control, requires that the regulation of the railroads shall be exclusively federal even as to intrastate traffic, though the state authorities shall be heard as to the latter, and it provides that the regulating body shall, in determining freight rates, base them on what will give a fair return to the investor.

The Cummings bill is more specific, and would set $5\frac{1}{2}$ per cent as a fair return to the investor and orders that on this return to capital all rates shall be based, granting, however, a further $\frac{1}{2}$ per cent as a regulation fund. This assumes that railroads will be able to borrow all the money they need at $5\frac{1}{2}$ per cent. Just at present foreign governments and municipalities are willing to give that and even more.

There is a competitive spirit shown that may make $5\frac{1}{2}$ per cent an altogether inadequate figure. Congress may name the rate, said Mr. Johnson, but it cannot compel investors to purchase stocks. It would appear, he added, that an authority should be allowed to issue a certificate of necessary revenue, and let freight rates be high enough to make it possible to secure such a return.

Samuel O. Dunn, of Chicago, the editor of *Railway Age*

Gazette of New York, then presented an argument based on the decline in railroad investment activity in the last few years. In his estimation we have fallen behind seven billion dollars since 1915, as compared with our investment for a similar time in the 10 years before that date. He estimated conservatively that we would need to spend six and a half billions of dollars in the next three years.

We have already planned to spend 633 million dollars on public highways, and they cannot be built because the railroads are not able to transport the material, so inadequate are the railways to meet the nation's demands. If the railway companies are to raise six billions or more of capital they must be allowed to earn such revenues as will make the investor willing to lend them money.

Magnetic, but not wholly fair, Clifford Thorne, a railway-rate expert of Chicago, then opposed the return of the railroads to private operation, saying that the standard return should be extended till the war throes no longer trouble us. He is a wizard with figures, but he did not venture to assail those presented by his opponents, though the audience could hardly fail to surmise that just that, and that only, was what he was doing.

Tuesday morning's meeting was addressed by E. W. Parker on "Labor Conciliation in the Anthracite Industry." Mr. Parker believes that the Labor Conciliation Board of the anthracite region should have its duplicate or duplicates in the bituminous fields. Possibly so; however, the bituminous coal operators watching the action of the board are not confident that it prevents strikes. It is quite a general practice in the anthracite region to have a local strike about every grievance however small, and finally after a week or so's duration the strike comes to an end, and the conciliation board gets busy.

In the bituminous region there is a similar local strike, which lasts about the same length of time and ultimately is settled by parleys between the operators' commissioner and the district president of the union. Button strikes, which are inexcusable from the point of view of the contract between mine operators and miners, are more frequent and severe in the anthracite region than in either the fully unionized or the partially unionized mines of the bituminous fields, and whenever a new contract is due, or the men want to make it due before the time, the work of the Conciliation Board is rendered null and void.

THE CONTRACTS ARE DIFFERENT

Just at this time the Conciliation Board may appear to be composing matters, but the reason why there is a strike in the soft-coal field and none in the hard-coal region is because the contracts in the bituminous-coal field mostly call for their termination at the end of the war—a date that the mine workers declare is in dispute—whereas the anthracite contract runs unquestionably to Apr. 1, 1920.

When April of next year comes, some cheerful optimist in the Central Competitive Region may be able to point out to Dr. Parker how much better things are there. However, the contract in the anthracite region is a "trailing" contract, if I may coin the word. It will be easier to make because the mine worker, the steel worker, the pressman and the compositor have learned that the public is against unreasoned increases.

The mine worker has asked more than pay and a half for half time. He has tried to cut his yardstick in two and add 60 per cent to the price of his goods. The public has proved its powers of resistance to this robbery, and so when the anthracite workers come to make a "trailing contract" they will not be so painfully dynamic and sanguine as their fellows in the soft-coal regions.

Dr. Parker declared that the Conciliation Board was free of the taint of politics. Congratulations are in order, but did

any bituminous operator ever find any politics, outside of union politics interfering in a settlement under the present regime? Union politics, in the anthracite region, as in the bituminous, appear to affect the operations of the Conciliation Board, for the frequency with which the labor leaders unanimously line up together in favor of the demands of the employees, causes the frequent reference of matters to the arbitrator of the Board.

Dr. George O. Smith, Director of the United States Geological Survey, in a paper entitled "Our Industries' Part," stated that the mineral industry had grown to a $5\frac{1}{2}$ billion dollar stature, but that the increase in production was only in a degree the reason why the figure stood so high. The market cost of the minerals had increased more than their volume of production. He would have freight rates based on cost of transportation and not on the exigencies of business. He declared that welfare rather than wealth should be our aim.

At the afternoon meeting held by the National Conference of Schools of Mines in the Planters' Hotel, papers were read by Lewis E. Young, now of the Union Electric Co., St. Louis, Mo., on "The Amount and Kind of Business Training, Including Economics, Cost Accounting and Business Organization to Be Taught in the Mining and Metallurgical Curricula," and by E. A. Holbrook, superintendent, United States Bureau of Mines Station, Pittsburgh, Penn., on "Closer Co-operation Between the Colleges, the United States Bureau of Mines and Industrial Corporations in Research Investigations." These papers, especially the first, were discussed at length. This was in strong contrast to the practice followed in regard to all the other papers, or almost all of them, presented to the Congress. There was no opportunity given for discussion at most of the meetings, the papers being read usually *in extenso* and passed over in silence.

The general attitude of the educational men present—and they were there in force—was to the effect that the average student was not psychologically prepared to study economics, cost accounting and business organization and did not realize the value and importance of those subjects; that, in many cases, the curricula were so full that the short years of student life were already overcrowded, though perhaps there was much, like higher mathematics, which might be left out.

As one professor said, mathematics may be excellent mental gymnastics, it may strengthen the sinews of the mind, but there are other exercises having a closer relation to the future needs of the student. It was remarked that after all the main purpose of college life was to stimulate the thinking habit and that the importance of the subject in the life work of the student was subordinate to its work in forming active mental habits and in giving the pupil the basis for the establishment of a sound judgment.

WHAT DOES THE STUDENT NEED?

The educationists quite generally admitted that it was hard to forecast just what training would help their men in their life work, for some would later be executives, some geologists, some metallurgists, some mining men. Others again would be analysts or educators. The differences in the metal and non-metal values to be recovered are as numerous as the occupations. There are few perhaps who would have to undertake the charge of companies, but equally true is it that only a few would be geologists. A knowledge of geology would be of little use to an analyst or an executive.

It is because of this fact that we must make our curricula all-embracing, so that it will not fail to give every mining student what he wants, even if more than he wants, remembering always that the imparting of knowledge and the causing of the student to think on any subject is valuable training in itself. If the interest in economics, cost accounting and business organization has proved lacking, it is probable that

it is because the value of these subjects has not been duly emphasized. We all have seen vital parts of education react unfavorably on the student because they are not taught interestingly and with conviction.

In many small colleges there are few indeed who can be depended on to teach these subjects with ability, especially when the instructor is not closely in touch with the mining field. In how few colleges are there good economists, cost accountants and business experts whose acquaintance with mining is really intimate? Then again all colleges have their specialties, and the strong parts in the various curricula are not always as closely based on the needs of the students as on the preferences of the professors and the lines in which they excel.

Well-balanced curricula require well-balanced talent, and where may such a balance be found? Some of the professors declared that methods of mining could not be effectually taught in the classroom even with expensive models and a multiplicity of charts. Some, lamenting their inability to create tridimensional vision in their pupils, would abandon methods of mining as a subject and replace it with something that an executive may well need to use.

Dr. Victor C. Alderson, president of the Colorado School of Mines, at Golden, Colo., declared that he made it his practice to give the senior students problems of actual life, political problems, it may be, and calls on them to discuss them before, and with, the assembled faculty. He will require them to make a constructive report on a mining property, not giving mere details of operation, character of ore and methods of working, but explaining whether the property was worth more or less than the price of its stock would indicate, and why, the idea being to get a thoughtful presentation of the real essentials of the mine as a financial proposition.

T. T. Read, of the United States Bureau of Mines, was not at the Congress and so could not present his article on "The National Temperamental Characteristics of Labor, making Certain Nationalities Suitable or Unsuitable for Mixed Labor in Mining and Metallurgical Work." In consequence this number in the program had to be passed over.

AN INTERESTING DINNER

An informal dinner was held at 6 p. m. at the Planters' Hotel with E. P. Mathewson, consulting metallurgist, New York City, in the chair. Interesting remarks were made on the labor problem, Arthur Thacher, of St. Louis, receiving quite an ovation after an address urging the power of the Golden Rule as a means of creating good relations and increased production in the mines. He stated that while the earnings per shift at the mines under his charge had increased from \$1.84 to \$3.74 from 1908 to 1918, both inclusive, the cost per ton had dropped from 68 cents to 47 cents per ton loaded, and the tons per man had risen from 2.7 to 8. At one of the mines he assured me the tonnage loaded by a Greek miner reached 110 tons per day.

At 8 p. m. another session was held at which Col. Roberts, of Roberts and Schaefer, construction engineers, made a report for the committee on the standardization of mining equipment. The committee has only recently been formed. There are sub-committees on mining and loading equipment, on underground transportation, on underground power transmission, on mine drainage, on mine ventilation, on outside coal-handling equipment, and on power equipment. Some work has been done, but the work is too large for speedy accomplishment and nothing would be gained by making snap judgments.

The late evening program was filled by addresses on "The Russian Radical as I Found Him," by George W. Simmons of St. Louis, Mo., who from actual experience in Red Cross work in Russia, had come to the conclusion that the Russian Red was every bit as evil as he had been painted; "The Red Men-

acc," by the Rev. Charles W. Gordon (whose pen name is "Ralph Connor"), a well-known novelist of Winnipeg, Can., who detailed the Red uprising in that city, and how the Reds were kept in check by the Citizens Committee of 1000 and the Northwest Mounted Police; closing with "What Is the Matter With America?", by Allen Walker of the Guaranty Trust Co. of New York City.

Extravagance, Mr. Walker said, lies at the root of the high cost of living in the United States, and is productive of some of the economic ills of which we are complaining. He said silk shirts and silk socks are all too commonly worn by people who, at the same time, are complaining of the high cost of living. He remarked that "the basic sin at the bottom of all our social unrest is that same covetousness against which we are warned in the tenth commandment." "The ruling passion is extravagance, the arch enemy of thrift, supplemented by a very common determination to do as little as possible for as much as can be obtained by fair or unfair means."

He said that a Boston hosiery manufacturer thought it would be a patriotic act to raise the price of silk hosiery and decrease the price of cotton hose. "To his astonishment," said Mr. Walker, "during the succeeding three months he sold 25 per cent more silk hose than before, and about 20 per cent less cotton." The teaching of simple economics to employees by business men, the speaker said, might prepare the great majority to combat in their meetings the talks of radicals.

MANY PEOPLE ARE MISLED

He said there is a class of "parlor socialists with whom it is regarded as quite the proper and fashionable thing to commiserate with the long-haired men and short-haired women who dispense anarchy in disguise."

"I know a number of worthy and thoroughly well-meaning men and women in New York who are being fooled to death by the new species of reformers and have been induced to support their camouflage by devious outward coatings of harmless sociological preachments." The Reds, he added, use the money of these men and women to spread literature which the latter are never allowed to see, and which they believe are far less revolutionary than they really are.

The real division of the people actively connected with the labor problem, he said, "is not between employers and workers, but is now between the constructive people and the destroyers." He recommended no compromise with advocates of unsound doctrines, the elimination of "class warfare," the observance of contracts whether by capital or labor, the removal by employers of legitimate grievances, maintenance of law and order, and the stern suppression of any organization which sets itself up as bigger than the government.

He advocated a "full day's work for a full day's pay." He denied that employers are attempting to break down the organization of labor, and declared that there should be no objection to "reasonable combinations of wage-earners organized for the purpose of improving the conditions of labor." No class of people, he said, should be permitted to choose which laws they shall obey.

"Year after year," he added, "labor has caused Congress to degrade itself by refusing funds for the prosecution of law-breakers. The same convention of mine officials which called the coal strike," he said, "presented a report in which it rejected the doctrine that unions and their officers can be held responsible for violence against the operators and workers of non-union mines." He said he would like to see emanate from some authoritative source a serious proposal for a twelve months' armistice between capital and labor, with an accredited commission to consider all grievances and controversies.

During the period of twelve months, he said, he would like to see an intensive campaign for production and thrift, because, he added, "we cannot save money to invest in securities

to help reconstruct the world and at the same time spend our earnings for luxuries which are beyond the means of the prudent and thrifty."

A meeting of the Safety and Welfare Section was held in the Exposition Building in the forenoon of Wednesday, Nov. 19. The first address was by C. W. Seiberling, vice-president of the Goodyear Tire and Rubber Co. He described the remarkable work of this company in the promotion of the safety and welfare of the employees.

Dr. J. J. Rutledge, mining engineer of the United States Bureau of Mines at McAlester, Okla., outlined a plan of securing safety in the mines by organizations established for that purpose. He said it was hard to induce the actual miner to take a part and even an interest in safety work. It was far easier to introduce it to the company man; but a little reflection will show that the miner is the man most greatly interested and he should be led to recognize that first-aid and rescue work, which is established for him primarily, should find him earnest in its support.

W. D. Ryan, commissioner of safety for the United States Bureau of Mines, made an address on the large returns paid by safety work to both employer and employee. He said that in Oklahoma the shotfirer is supposed to tamp every shot. Recently one man fired 85 shots in 45 min. Mr. Ryan left it to the audience to say whether he tamped a single one of them. The last one "got him." Does such foolishness pay any one in the long run? The fatality is bound to happen if chances like these are taken.

Mr. Ryan said that the safety engineer should have power to act without reference to headquarters. A man who was engaged to inspect the mines, but not remove dangerous conditions or have them corrected, reported to the manager when he returned to the office that there was some loose rock over a light board overcast under which men were continually passing. When the manager got the communication, he turned it over to the superintendent in the regular order of business. This official passed it on to the mine foreman, who in turn instructed a man to remove the hazard. There are all kinds of possibility of delay in so passing up information to the manager and in so passing down instructions to the foreman. Meanwhile the lives of men are jeopardized.

GOOD SAFETY RESULTS WERE OBTAINED

Austin Duffy, manager of the Safety Section of the United States Fuel Administration, then read an address on the "Result of the Safety-First Movement on Labor." He declared that accidents were reduced 56 per cent during a safety campaign extending over two weeks, the campaign being waged on the broad lines which are calculated to reach not only the man in danger but his family also.

Charles S. Allen, secretary of the New York Wholesale Coal Association, at the afternoon session, gave some facts as to the invasion of oil in the boiler rooms of the East where coal was formerly used exclusively and emphasized how and why the aggression should be repelled. Whenever oil is installed the company officials who introduce it must defend their action in order to excuse it and to give satisfactory account for the expenditure of the money.

The employees who find that oil is a saving of labor naturally declare that oil is the preferential fuel, even when they know it is a source of financial loss to the corporation. In fact, they tend to prevent a return to coal. The oil men are quite ready to lend money to corporations to pay for the installation of the necessary oil-burning equipment. Thus the Missouri, Kansas & Texas Lines were advanced \$650,000 by the Mexican Petroleum Co., according to Mr. Allen, so that it could make the changes incident to a transfer from coal to oil burning.

At Providence, 200 industrial plants are already burning fuel oil and more are on the way. Similar conversions of

equipment have taken place at Pawtucket and Fall River. One concern, however, fitted up six out of ten of its boilers to burn oil, but took the oil-burning equipment out after six months and reinstalled coal-burning stokers at the expense of \$25,000, for which the fuel-oil company paid. Another company having seven units, fitted three up to burn oil and scrapped the rest, but today they are back in use. The Pocasset Manufacturing Co., Mr. Allen said, having 27 boilers, spent \$5000 in investigation. It found it would take 24 years to pay back to it in savings the cost of installing the equipment. The Essex Rubber Co. declares that there is no saving to be made in using oil with fuel at 3 cents per gallon.

The New York Wholesale Coal Association has engaged a combustion engineer to find out the whole truth regarding the possibilities of oil. Mr. Allen said that the question is not one for New York alone to solve, for the matter is interesting to many cities and not to the tidewater municipalities only, for oil is accessible to all places that can be approached by water, and there are few indeed, even in the Middle West, that can not be so reached.

Paraffin-oil residues, according to Mr. Allen are not suitable for use under boilers. Mexican fuel oil does not have a paraffin base, and it is therefore more suitable than most oils from the United States. The prospect for the continued use of United States oil is also problematical, said Mr. Allen, for while 7 per cent of the available coal has been used, it is estimated that as much as 40 per cent of the available oil has found its way to the market.

THE STORY OF COAL

Following Mr. Allen, James Taylor, special mines investigator of the Department of Mines and Minerals, in Illinois, delivered a written address on "What Is the Cause of the Present Labor Discontent?" Mr. Taylor's address was couched in almost classical language, and I should but do violence to it if I attempted to brief it here. The delay in starting the afternoon meeting made it necessary to pass the other addresses over to the next day. A motion picture, "The Story of Coal" was then shown by Morton F. Leopold. The film has just been completed by the Safety Division of the United States Bureau of Mines, co-operating with the National Coal Association, the latter body expending \$10,000 on its production.

It shows most of the operations of mining and preliminary to mining and is extremely interesting, especially that part of it where a motion picture is taken of an entry, the photographic machinery being propelled on a truck and carrying 16 lights of 64,000 aggregate candle power.

The film being rotated by hand, the speed of operation was excessive. The men in the working places seemed to be working almost breathlessly. No man could work as these men labored for more than perhaps 10 minutes at a time, and the speed of the same movements could not have been duplicated in actual practice even for that length of time. It is a pity when mining films are so rapidly run through the kinematograph, for they give the idea that the miners and laboring men are harried at their work till they work like men possessed, which, of course, is not true.

At the formal dinner held in the Planters' Hotel on the evening of Wednesday, Gov. Frederick D. Gardner, of Missouri, was the leading speaker and Robert E. Lee was the toastmaster. Other speakers were James G. Strong, a representative of the House from Kansas; F. F. Foss, the chairman of the Russian Mining Commission, and the Rev. Charles W. Gordon, of Winnipeg, Manitoba, who was on this occasion heard for the second time, his talk being on: "The Industrial Situation in England." Mr. Gordon greatly affected his audience, emphasizing the spiritual elements of the labor problem. He frankly admits that he is a radical and that he has great

regard for the labor leaders of Great Britain, but his attitude is certainly one that will appeal to every one, for he has absorbed none of the toxins of radicalism and recognizes the idealisms of both employers and employees.

On Thursday morning J. C. Thompson, director of the Department of Mines and Minerals of the State of Illinois, gave an address on "Stabilization of the Coal Market Through Storage." No one could fail to approve of its purpose, but the treatment of the subject seemed to have suffered from the slipping of a decimal point two places to the left. The depreciation of coal in four months is surely not 25.0 per cent, but 0.250. Granted, however, that it is the larger figure, we can see that Mr. Thompson has hit on the correct cure—storage under water.

As a matter of plain, ascertained fact, coal, if it is stored in the open, loses only in its sizing and not appreciably in heat units unless it heats or burns. Storage under water must be done at the plant where the coal is used or the coal will freeze solidly in the cars during winter transit. Coal can only occasionally be stored under water at the plant that expects to burn it and when it does the drying of it under the boilers is an expensive process, far more expensive surely than is justified by the slight saving effected by the preservation of the entire thermal efficiency of the dry coal.

Edwin Ludlow, consulting mining engineer, of New York City, read an excellent paper showing how the anthracite region suffered from government regulation, and stated that Dr. Garfield was fair enough to admit that his final price was 50c too low to protect the anthracite operators from loss, but nevertheless he did not reach the point of raising the price to the level that he well knew to be equitable.

PLAN OF STANDARDIZATION PRESENTED

George S. Rice, chief mining engineer of the United States Bureau of Mines, delivered an address describing a proposed system of standardization of coal. Any producing company could arrange to enter its name. It would specify its own analysis and the Government would certify the mines on that basis, inspecting the shipped coal at intervals and withdrawing certification if the coal did not measure up to the standard the company had elected. However, the producer is not to be penalized for his coal not being up to standard. He will be required to make a new standard which he appears competent to fill and may then be certified as before. This plan was proposed by O. P. Hood, the chief mechanical engineer of the United States Bureau of Mines.

Dr. Henry Mace Payne, chairman, coal export committee of the American Mining Congress, then made a report on the activities of his committee, stating that the foreign coal trade was brisker in the summer when insurance rates were low and unloading facilities in northern ports were favorable. Thus foreign trade would serve as the much needed balance to help carry the coal trade through the summer, aiding both East and Middle West, the latter by relieving the pressure of Eastern coals in the Middle West markets.

R. Dawson Hall read a paper on "The Industrial Clean-Up," saying that the houses built in mining villages in the early nineties were more nearly in keeping with the homes in the small towns adjacent than they are today and similar to those used by lumbermen, the lumber interest in those days being one of the most important, if not the most important, in the areas where coal was mined. Years have not effaced these houses. They stand like billboards along the main railroads of the country, and they give the public a poor idea of the mining industry.

An attempt should be made to induce the owners of the old villages to clean up. The newer towns, well back from the main roads, are slightly habitable places as a rule, but the public never sees them. The older villages, that are better

entitled to be termed "camps," from tippie to coal house, are far from presentable, and care should be taken to render both the plant and the houses seemly places. If this is done the town, with its prominent position, will no longer be a disgrace but an advertisement, such as manufacturers along a railroad spend much money to attain.

In the afternoon of Thursday, Alva C. Dinkey, president of the Midvale Steel Company of Philadelphia, Penn., presided. S. R. Russell of the Du Pont Powder Co., Wilmington, Del., read a paper on "Practical Uses of Explosives from a Safety Standpoint," and Dana Caulkins, secretary, National Physical Education Service, Washington, D. C., made a splendid address on "Physical Efficiency and Its Effects on Production." He urged that physical deficiency was the twin brother to moral deficiency and declared that rarely will you find a physical exemplar disposed to morbid thoughts and evil broodings. He stated that the death rate from organic disease in the State of Massachusetts had increased 86 per cent, and declared that the change arose from the abnormal lives that the people of Massachusetts, as also ourselves, are living. Formerly our days were shortened by darkness; rich foods were not available and exercise was enforced by lack of facilities for the saving of human labor.

HEALTH IS EASILY SECURED

Health can be assured if only 50 per cent of what is indicated as best is diligently followed, for the human mechanism is fairly foolproof and tries to function despite the strain put on it. He urged that physical defects, including bad teeth, adenoids and enlarged tonsils, were to be found in most persons and that 75 per cent of the school children of the country have impaired mentality as a result of their bad health.

George L. Nye, special counsel of the American Mining Congress, Denver, Colo., made a report on "The Minerals Separation Ltd. Situation," and F. A. Wildes, state superintendent of mines, Hibbing, Minn., spoke commending "The Minnesota Leasing System." His optimism, however, reached its height when he said that the state hoped to earn a revenue from the five billion tons of peat bog in the swamps and overflowed lands of the commonwealth.

Thomas T. Brewster was not present to explain "The Value of a Contract." There is but one word that will express that value, and that is "Nothing," as has been learned more than once recently.

THE ANNUAL BUSINESS MEETING

The Annual Business Meeting of the Congress met at 7.45 P. M. of Thursday in the Planters' Hotel, where a report was rendered as to the action taken by the directors of the association during the past year, which report the meeting approved. The annual receipts of the Congress are roughly \$75,000 a year, the income being derived from a voluntary assessment of 10c per thousand dollars of output. Mr. Callbreath roughly outlined what had been done to relieve the mining industry and other industries which in operation were compelled to "waste" or, better, "exhaust" their resources.

These "wasting" industries include of course, the oil, gas and lumber industries besides all those producing metallic and non-metallic minerals. These industries, for many reasons, cannot operate on the basis that an inexhaustible supply of materials is available for their exploitation. What has been found and developed at considerable expense and what we have only learned to extract by the erection of trial plants often costing hundreds of thousands of dollars, must be regarded as having a large initial value in the ground which should be properly allowed for in making income-tax returns.

The attitude of the Internal Revenue Department and Congress is fair, and always would have been so, had they really understood conditions or in the rush of war had been granted

time to consider them. It was the work of the American Mining Congress to supply the facts and urge them on all who were concerned in the regulating of taxation, so that justice should be done the mining industry. Another work of the Congress was to obtain relief for those who at great expense had endeavored to obtain war minerals for the Government in time of its need and now were left without a market. The American Mining Congress hopes soon to have in its staff an authority on taxation and another on freight matters so that these important parts of its work may be in charge of competent departmental authority.

DIRECTORS CHOSEN

The following were elected on the directorate: R. C. Allen of Cleveland, Ohio; Col. D. B. Wentz, a coal operator of Philadelphia, Penn.; T. T. Brewster, a coal operator of St. Louis, Mo.; and John C. Howard, as a representative of the petroleum interests. These directors will serve for three years or until their successors are elected.

Bulkley Wells was announced as president; Harry L. Day, first vice president; Col. D. B. Wentz, second vice president; E. L. Doheny, third vice president, and J. F. Callbreath, secretary. E. P. Mathewson and Walter Douglas, both of New York City, were elected members of the executive committee who, with the president of the Congress, direct the business of the organization between meetings of directors.

On Friday morning, John A. Davis, the governor of the Alaska Chapter of the American Mining Congress, read an address on "The Alaska Coal Situation," urging that only cheap power, preferably generated at the coal fields of Alaska, would save the day. The metal-mining industry depends on steam or electric power, and the farming industry depends on metal mining. So power is the base on which the prosperity of Alaska must rest. Alaska may be lost again if some means are not provided to make its mineral resources available, for the bonanza gold no longer exists, and mining is not any more a matter of pan and muscle but a dredging proposition.

TWO DECIDEDLY OPPOSITE VIEWS

John Leitch, industrial engineer of New York City, author of "Man to Man," then followed, and Charles Piez, president of the Link Belt Co., of Chicago, succeeded him. They delivered radically different addresses. One viewed the problem from the human standpoint, and the other from the legal. If labor cannot be coaxed by the methods of a Leitch it will have to be restrained by law as indicated by Mr. Piez. In the long run good will is better than law and restraint. We need both points of view, contradictory as they may appear to be and cogently as both presentments were stated.

On the afternoon of Friday, Governor A. H. Roberts, of Tennessee, made an address in which he said that the Tennessee people had formed law-and-order committees in every community which were determined to keep the peace and suppress Bolshevism. He spoke at length on the principles of the Constitution and urged that we get back to them as a sure basis of prosperity and happiness.

The meeting then took up the presentments of the resolutions committee, among them one urging railroad rate differentials to equalize the demand for coal as between seasons. Minneapolis and Spokane both requested that they be honored by being the hosts of next year's convention. With this session the Congress closed its deliberations.

A word should be said here as to the Exposition. It was certainly the best the Congress has ever held, yet it has managed some more than ordinarily good ones in the past. The convention hall being in the exposition building, the chance of sightseeing that the booths offered somewhat interfered with the attendance at the meetings, for the interest in the exhibits was sustained up to the last day.

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Accelerating Publication

THE present issue of Coal Age is a large combined number and covering the issues of Nov. 13 and 20. It contains an account of the meeting of the American Mining Congress, which ended its sessions November 22. The following issue will also be a combined number and contain the issues of Nov. 27 and Dec. 4, but it will incorporate an account of the meetings of the West Virginia Mining Institute, which met Dec. 1 and 2, and the Coal Mining Institute of America which was in session Dec. 3 and 4. It will, therefore, not only be a big issue, but it will contain up-to-date material such as our readers will be looking for. One other combined number will bring us fully up-to-date, and from then on we shall continue the regular schedule.

The reader will note that in our editorial comment an attempt has been made to keep fully abreast of the times, though that has caused us sometimes to take cognizance of, and make comment on, events occurring after the putative date of publication.

We have had over one hundred letters of sympathy and kindly wishes. They still continue to come in, and they show no abatement in the public support. One dated Nov. 22 says: "As a subscriber to the Mining Journal and Coal Age, I am in full sympathy with your present course." Another dated Nov. 25 says: "We depend entirely on your journal for market conditions. Is the elimination of the department permanent?" Indeed it is not; Coal Age will resume all its departments as soon as the date of publication becomes identical with the date line of the paper.

The Difference and the Reason

ONE consideration among others that distinguishes man from the lower animals is the fact that he uses tools. In war he employs various engines of destruction, ranging from rough stones to poison gas, instead of his own teeth and nails. In peace he uses largely implements and machines both hand- and power-driven, not his own hands, to accomplish his desired ends be those ends the raising of a grain of wheat or the transmission and preservation of intelligence in the form of the printed page. This trait of the genus homo also serves in large measure to distinguish family from family, nation from nation and race from race.

It is not, however, the possession of, but rather the mental ability to construct and direct this machinery that raises civilized nations markedly above the level of the savage or semi-barbarous tribes. It is ability and habits of thought that really count.

With this idea in view our forefathers built and insisted upon maintaining the "little red schoolhouse" even though its maintenance often involved no small degree of peril and sometimes privation. They realized that in the last analysis the mind was superior to circumstances and could enable an individual, even physically weak, to fill a useful place in society and be a man among men.

They saw clearly that the foundation of stable democracy rested solely upon educated intelligence.

If one wishes to see a practical demonstration of how thoroughly material progress rests upon the character of the people involved, he has but to make a comparison between the countries of North America and those of northeastern Europe and northern Asia. The United States and Canada are in many respects naturally comparable to Russia, European and Asiatic. Each has or had its vast fertile plains, its mighty rivers, its great mountain barriers, its tremendous mineral wealth, its frozen wastes. Each is held and governed, tilled and developed by Aryan whites.

But here the similarity ceases. In the western hemisphere we find the land cultivated, the mines and timber areas developed, the waterfalls harnessed; we find railway after railway spanning the continent from coast to coast linking ocean with ocean by bands of steel; everywhere we find active industry, populous towns and cities, prosperous farms and peaceful and happy homes.

In Russia we find the natural resources either untouched or at best inadequately developed; one lone single tracked trans-Siberian railway, the rivers untrammelled, the soil idle or cultivated in a medieval half-hearted way largely by hand methods and with implements actuated by human muscles. And at present in a country of plenty—a region naturally rich—famine, fever and starvation stalk madly through the land, while long-established laws, customs and social usages, built upon the collective experience of all mankind since the world began, tremble and totter before the onslaughts of an irresponsible minority and red riot, murder, pillage, flourish unrebuked and unpunished.

Wherefore this discrepancy between two lands naturally similar? The logical reply is that it lies solely in the mental and moral fibre and stamina of the two peoples, in the quality and quantity of their thought output.

It behooves us, therefore, if we desire that the land of our nativity shall continue to grow and flourish and wax ever stronger among the nations of the earth to see to it that each and every individual shall have both opportunity and adequate encouragement to develop all and sundry of his latent powers. Only among a people where ambition is a virtue and ignorance a crime are the principles of democracy secure.

American Coal Export Trade

During the past several months or ever since the signing of the armistice, American coal operators have heard much of the possibilities for the exportation of fuel. Some of the reports received were couched in decidedly glowing terms and many producers were anxious to reap the promised harvest. Unfortunately many of the cargoes shipped were not up to the standard of quality and preparation desired by some foreign purchasers. As a result American coal in many instances received a veritable "black eye". Furthermore, the field is not as large as it was at first thought to be although it is big enough to be worth while securing.

In the export trade preparation and appearance count for much. Thus a shipment of outcrop coal or one that is stained or rusty on top is liable to rejection. The foreign market is therefore by no means an outlet for fuel not salable elsewhere, buyers and users abroad being even more critical than domestic consumers. This doubtless arises from the extremely careful preparation of the English product to which they have been accustomed in the past.



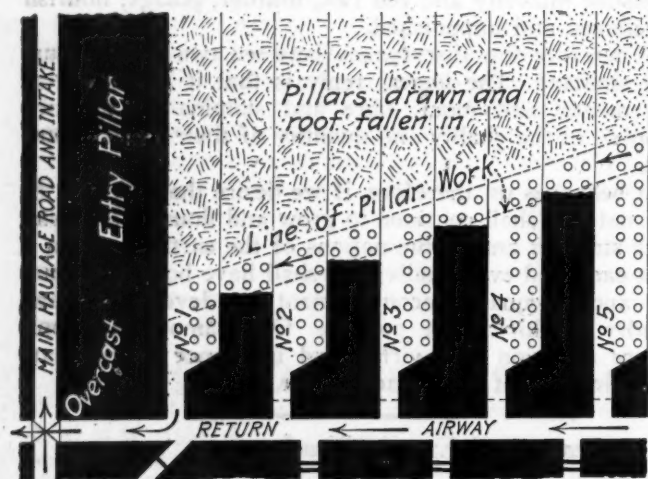
DISCUSSION *by* READERS

EDITED BY JAMES T. BEARD

Problem of Coal Extraction

Letter No. 9—Referring to the article relating to the best method to be adopted in order to obtain a maximum extraction of coal, COAL AGE, Aug. 7, p. 234, allow me to say that it would be impossible to do very much in the way of improving the conditions and increasing the percentage of extraction, by following the plan presented, showing the underground working of a mine already in operation. The mine is not properly laid out, and it is no surprise to me that but 50 per cent of the coal is taken out, the remaining half is lost beyond recovery.

Briefly stated, a few of the causes responsible for this failure are the following: 1. The plan shows too large an area being worked. A smaller extent of working would probably give a much larger extraction at a less cost of operation. 2. The room pillars are too small for this depth of cover, resulting in a large loss of pillar coal, by reason of the crushing of the pillars before they can be taken out. 3. The robbing of the barrier pillar before that is necessary, judging from the condition shown in the figure.



SHOWING UNIFORM LINE OF PILLAR WORK

To my mind, the man who supervised this mine does not seem to have cared for anything except getting out coal, no matter at what cost. This is apparent from the thousands of feet of tracking required, the great amount of timber needed and the large number of entries, crosscuts, and breakthroughs driven for a comparatively small output of coal. Also, the room pillars are much too small and, apparently, are not robbed at the right time.

My plan of working is shown in the accompanying figure, which requires little explanation farther than to say that as quickly as the rooms are driven to their full length, the pillars are drawn back in regular order, taking care to keep the line of pillar work as straight as practicable, so also prevent any excessive pressure being thrown on the ends of one or more pillars that may lag behind. In this plan, two rows of posts are used to protect the ends of the pillars while they are being drawn back. As the work progresses and

the roof breaks behind these posts, the back row of props is drawn and a new row set in place next to the coal, as indicated in the figure.

Rawdon, Quebec, Canada.

C. McMANIMAN.

Letter No. 10—I have read with interest the letters bearing on the proposition of extracting the maximum amount of coal from a seam varying in thickness from $8\frac{1}{2}$ to 11 ft. and lying at a depth ranging from 450 to 600 ft. Judging from the facts that were given in the original article on which this discussion is based, COAL AGE, Aug. 7, p. 234, it would seem that the thickness and depth of the seam are the most important factors to be considered in the development of this mine with a view to recovering a maximum amount of the coal.

There are probably a number of methods of supporting roof and systematizing the timbering, which a study of the local conditions regarding the roof, floor and coal would assist in determining the choice. Certainly, the suggestion made by previous writers, in respect to leaving the top layer of coal up to support the soft shale above it and prevent its disintegrating under the action of the air, is practical and should be adopted in working this seam.

The chief cause for the waste of so much coal, however, in the working of seams of this thickness or less, under such a depth of cover, generally arises from leaving insufficient pillars for the support of the overburden. At this depth, the roof pressure is an important factor and careful attention must be given to the ratio of width of pillar to that of opening, or trouble is sure to follow.

GUARDING AGAINST FUTURE TROUBLE

Referring to the first letter, written by "Assistant Foreman," Sept. 4, p. 416, let me say that driving double-neck rooms such as he has suggested would, in my opinion, soon bring on a squeeze and result in the loss not only of the 25-ft. room pillars but the entry pillars as well. At a depth varying from 450 to 600 ft., the entry stumps left in the mouths of these wide rooms would weaken and be crushed before the room pillars could be drawn back.

In the proposition described and illustrated in the second letter, Sept. 11, p. 458, two rooms are opened off a single neck 18 to 21 ft. in width and driven to a depth of 100 ft. before being widened to 30 ft. While this plan has the advantage of solving the yardage expense, it presents inadequate protection to the entry, owing to the soft nature of the middle coal and the roof and will cause future trouble.

Here, too, it is my opinion that the roof pressure will be too strong for the proper protection of the entry, and it would be better to pay the extra yardage and drive the roomnecks at a less width. Let me suggest turning single rooms, on 60 to 75-ft. centers, making the roomnecks 12 ft. wide and driving them to a depth of 30 or 40 ft., after which the rooms can be widened to the full width, say 25 ft.

If it is then desired to open a second room off the first and the problem of ventilation can be solved easier than the extra expense of yardage, let the second room be opened in the rib of the first, at a distance of, say 60 ft., where the first breakthrough would be made under ordinary conditions. This

would avoid the enormous waste of coal that I fear would result in drawing back the pillars in the proposed arrangement.

In this plan, with room pillars 35 to 50 ft. in width, there would be a good solid entry pillar that would give adequate protection and make it possible to recover the maximum amount of pillar coal. It appears to me, however, that the line of brattice required to properly ventilate the rooms, in necking the second room off the first, would amply justify paying the extra yardage.

In closing, let me repeat that my plan would be to neck each room off the entry on centers that will provide an ample room pillar. The first breakthrough should be made at a distance not less than 60 ft. from the entry. I know of no other method by which to avoid so large a loss of coal as is claimed in the working of this seam. All squeezes of which I have any knowledge have primarily been due to insufficient pillar support. In my opinion, under the conditions described, the width of room pillars should not be less than 35 ft. and room centers should be at least 60 to 80 ft. to give a maximum recovery of coal.

Thomas, W. Va.

W. H. NOONE.

Roller Bearings for Mine Cars

Letter No. 2.—A short time ago I read a letter in COAL AGE (Sept. 25, p. 545), strongly advocating the use of roller bearings for mine car wheels. At different times, previously, there have appeared many similar letters discussing the relative advantages of plain and roller bearings, and giving marked preference to the latter type of bearing. It seems to me that it is only proper to note that there are many things that could be said in favor of the plain-bearing mine car, which is always abused, usually neglected and generally misunderstood.

In spite of the meritorious claims of cylindrical roller bearings, it must be admitted that they have never been adopted for use on freight cars, passenger cars, street cars, and the majority of mine cars, dynamos, motors, turbines, line and countershafting, engines of all kinds, machine tools or the crank shafts and rod-end bearings of the automobile motor, the last named being one of the most difficult bearing problems known to engineers. Neither are roller bearings used in the best makes of automobiles and on many of the heavy motor trucks.

WHY HAVE NOT ROLLER BEARINGS BEEN MORE GENERALLY ADOPTED IN MINE EQUIPMENT

With a knowledge of these facts in mind, one is led to ask the reason, since it appears that the judgment of the engineers concerned is quite generally opposed to the use of cylindrical bearings for the purposes mentioned above. Inquiry among coal operators shows a difference of opinion as to the economy of roller-bearing car wheels in comparison with a well-designed, properly made, solid bearing of suitable material and provided with an efficient oiling system.

I also find that the advocates of roller bearings for mine car wheels do not themselves agree on whether the solid or the spiral roller is best suited for the work. Again, those who advocate the spiral roller are hopelessly divided on whether they should be mounted in the wheel hub, or in a box under the car.

After a careful study of the advertisements and recommendations of mine-car-wheel manufacturers, it appears to me that the majority of them now recommend the spiral roller; whereas, for many years past, they have proclaimed the virtues of the solid roller. This would seem to indicate that the spiral roller gives better satisfaction; but there are yet to be found many advocates of the solid roller who see no

advantage in the new type. It must be admitted, however, that very many operators are discarding the solid rollers and replacing them with spiral rollers, in the belief that the latter possess more merit than the former and hoping that the results will meet their expectations.

From my knowledge of the situation, it appears to me that most advocates of roller bearings argue for the doubtful (?) saving in power, but are silent on the cost of maintenance and length of life of the bearings. Attention has been called to the saving effected by dispensing with the oiler, in the use of roller bearings; but nothing is said in regard to the number of car repairers required to maintain the roller-bearing equipment after a service of one or two years.

USE OF GREASE FOR LUBRICATING MINE CAR WHEELS CALLED IN QUESTION

In my experience, the claim of greasing roller bearings once in from 6 to 18 months is not supported by facts. The claim of reduced cost of lubrication appears to be based on the use of a compressive grease, while most operators find it necessary to use a flowing oil to make the cars run easy and save the bearings. The claim of "no more bored out wheels" is not important, unless it is shown how long the wheels have been in service, the kind of material and whether or not the bearings were proportioned to carry the load, and were sufficiently oiled with a proper lubricant.

It is my desire to be fair and just in the treatment of this matter of mine-car bearings, but observation leads me to ask if the piles of worn-out roller-bearing axles and broken-down cages, found around coal mines, where heavy loads have been carried on them for two or three years, help to support the claim of the superiority of this type of bearing under the severe service to which they are subjected in coal mining. At mines where roller-bearing and plain-bearing wheels are both in use, I have frequently observed plain-bearing cars running much more freely than those mounted on roller bearings, and handled in the same trip.

In view of the confusion of thought on this important subject prevailing in the minds of coal operators, and the continued experiments being conducted to establish the claims of superiority of cylindrical roller-bearing car wheels, let me ask if it would not be wise to pause and consider whether observation and experience do not recommend a solid bearing, properly designed, made of suitable material and fitted with an efficient means of lubrication, wherever heavy loads are to be carried at high speed?

Birmingham, Ala.

J. F. FOX.

Finding a Mine Door Set Open

Letter No. 9—I read with interest the inquiry of Richard Bowen, COAL AGE, Sept. 11, p. 462, who is anxious to learn the opinions of practical men in regard to the manner in which a fireboss should proceed on finding a mine door set open when starting to examine the section of mine in his charge.

Assuming the conditions described and illustrated by Mr. Bowen, I agree with him that it would not be wise to close the door, before making an examination to ascertain the condition of the working places in that section. It appears clear, in the case he has cited, that the closing of the door could only result in dislodging the gas accumulated at the face of Chamber 2 and driving it on to the burning feeder in Room 5, where it would be ignited and an explosion follow.

There are other reasons, moreover, why the door should not be closed without first making an investigation to ascertain, if possible, the cause of its being set open. For example, there may have occurred a heavy fall of roof somewhere on the return of that section, and nightmen may be engaged in cleaning up the fall.

The driver may have carelessly or recklessly set the door open in order to relieve himself of the necessity of opening it when passing in and out hauling the refuse to the shaft bottom. All are anxious to get the fall cleaned up so that coal can be pulled from that section the following day, and they give little heed or thought to the probable result of the door standing open, especially as it gives them better air on the entry where they are at work.

Assuming that the rooms on the intake as shown in Mr. Bowen's sketch are driven to the rise, it is natural to suppose that there is a considerable body of gas accumulated at the face of Room 2, and it is easy to imagine what would take place should the door be closed, even if there was no gas feeder burning in Room 5 as stated.

The restoring of the circulation in the rooms by the closing of the door would at once dislodge the gas accumulated at the face, and it would be carried by the air to the point where the men were working with open lights, and another disaster would be recorded as the result of the fireboss' incompetence. My conclusion is that the only wise policy for a fireboss to pursue, in such a case, is to investigate thoroughly and ascertain the exact condition and situation in the section before closing the door.

West Franklin, Ill.

CHAS. RODENBUSCH.

Letter No. 10—The discussion of this subject in *COAL AGE* should prove of great interest and be the means of imparting much valuable and practical information, gleaned from the experience of many competent firebosses who have had to deal with this condition when starting to make the daily examination of a mine or section of a mine.

The question is, Should a fireboss, on finding a door set open and the ventilation thus destroyed in the section of the mine he is about to examine, close the door and proceed at once with his examination; or, leaving the door in the position he found it, first examine to ascertain the condition of things in the section and make sure that it is safe to close the door?

As stated in this inquiry, the answer generally given in textbooks, is "Close the door and wait until the circulation is restored in the section, before proceeding with the examination." Considering a gaseous mine, this answer is clearly in error as is plainly in evidence from the incident cited by the inquirer and which led to this discussion.

Not many years ago, in this district (Jefferson County, Ala.), a very serious disaster resulted from the closing of a door, after it had been standing open probably several hours. In that time, a large body of gas had accumulated in the workings and the restoration of the circulation by closing the door carried this gas on to the open lights of the workmen engaged in another part of the mine. In the explosion that followed many lives were lost. This is but one of scores of similar accidents, which have not been without their effect, however, in the lessons they have taught.

Realizing that it is the common practice of miners to close a door that is found standing open, coal operators in this district have profited by the dearly bought experiences of the past and have appointed safety men to look after the general safety of the several sections of the mine in their charge. Each section is small enough to permit the inspector to make two rounds of his section in a shift. This, with the examination made by the fireboss, make three inspections a day throughout the mine. Besides all this, there is a doorman appointed whose duty it is to make sure that all doors are self-closing and no one is permitted to prop a door back to prevent its closing.

I do not approve of the suggestion offered by the inquirer, that the examiner make a firerun before closing the door. My reason is that by the time the examiner has made the "firerun" and completed his later examination of the places after closing

the door, he would be too late to meet the men at the shaft bottom and notify them of the condition of their places.

When a fireboss is late in returning from his examination of the mine, he finds many of the men have gone home for the day. A late fireboss arouses the suspicion in the minds of the majority of the men that everything is not right and the management are taking chances, which affords them a good excuse for not working that day.

It is not my meaning, however, that a burning feeder is of no immediate danger in a mine; or that the fireboss can assume no danger is present and proceed to close the door without further investigation. But I want to urge that the safe operation of a gassy mine requires the employment of a firerunner, other than the fireboss, and whose duty it is to see that no feeders are left burning in the mine.

The firerunner should make his inspection of the entire mine or section in his charge, as soon as practicable after the men have left the mine for the day. He should also see, that every place is being properly ventilated and that all doors, air bridges, regulators and brattices are in good condition and properly adjusted.

Like the fireboss, the firerunner should mark the date of his inspection at the face of each place examined, using a colored crayon to distinguish his mark from that of the fireboss following him a few hours later. Like that official, the firerunner must make his report in a book kept for the purpose, which must be read by the fireboss, before he proceeds to examine the mine the next morning. A firerunner should, of course, never close a door that he finds set open, until he has run through the section and made sure that it is safe.

EXAMINATION OF A MINE SHOULD ALWAYS BE STARTED AT THE INTAKE END

Having settled the question of a burning feeder by the appointment of a firerunner, which leaves the fireboss free to close the door and complete his inspection in the appointed time, let me refer to the suggestion of starting the examination at the return end of the section. I must beg to differ in this respect.

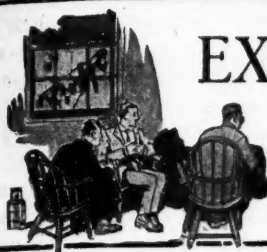
Permit me to say that a fireboss should invariably start at the intake end and follow the air current, in making his examination of each split. This does not imply, however, that the several splits must be examined in their regular order, starting from the shaft bottom or intake of the mine. It is the custom of most firebosses of my acquaintance to examine first those sections that give off the least gas, leaving the more gassy sections to be examined last, as this plan affords less time for gases to accumulate before the men enter their places.

For sake of illustration, let us follow a fireboss starting his examination at the return end of a gassy section. Carrying a flame safety-lamp, he hastens along at an average rate of, say 4 miles an hour, or 350 ft. a minute, traveling against a current having a velocity of, perhaps 200 ft. a minute. Even taking no account of the current, the rate at which the man walks exposes his Davy lamp to an unsafe velocity of air, while the effect of the opposing current is to make an effective velocity of 550 ft. per min. against the lamp. Some forms of bonneted Davy lamps will safely withstand a current velocity of 600 ft. per min.; but the fireboss' Davy commonly used becomes unsafe in a velocity exceeding 350 ft. per minute, which makes the plan dangerous on this account alone.

Again, if the fireboss has passed over a considerable portion of his section before finding a faulty door or brattice that has permitted an accumulation of gas, his previous work counts for naught, as these places must all be examined again, after the trouble has been corrected. At the best, when traveling against a gassy current, the examination of a gaseous mine can never be considered reliable, aside from its safety.

Bayview, Ala.

JOHN WALLS, SR.



EXAMINATION QUESTIONS

ANSWERED BY
JAMES T. BEARD



Anthracite Foremans' Examination Old Forge, Penn., May 6, 1919

(Selected Questions)

Ques.—What is ventilation, and why is it necessary in coal mines?

Ans.—Ventilation is the circulation of a current of pure fresh air in and through the workings of a mine and so distributing it as to sweep away and dilute the noxious and inflammable or explosive gases produced in the mine.

Ventilation is necessary in order to make and keep the mine atmosphere pure, healthful and safe for the performance of work. Not only is it necessary to remove the noxious air and gases produced in the various operations in the mine and by the different forms of combustion constantly taking place, and dilute and render harmless the inflammable and explosive gases generated, but the quantity of air in circulation must be sufficient to comply with the requirements of the state mining laws where the mine is located.

Ques.—Explain the safest and most effective way of circulating air through a mine.

Ans.—While furnace ventilation is very effective in deep shafts generating no gas, the most reliable means and the safest to adopt, in the ventilation of a mine, is a properly designed centrifugal fan capable of circulating the required quantity of air under a specified water gage varying from, say $1\frac{1}{2}$ to $2\frac{1}{2}$ in. Aside from the ventilator, it is important to adopt a practical and effective means of conducting and distributing the air throughout the mine, according to the different requirements in the several sections of the workings.

Every mine should be divided into two or more ventilating sections or districts, which should increase in number as the development advances. The plan is known as the split system of ventilation and requires substantial and well built air-tight doors, stoppings, air bridges, brattices and regulators. In this plan each section of the mine is ventilated by an air split taken from the main air-course and conducted into the main return airway after circulating through the section. By this means, it is possible to increase or decrease the quantity of air circulating in any section so as to conform to the requirements in that section.

Ques.—Is it safe to pass a current of intake air through the abandoned portions of a mine and then conduct it to the face of the live workings? State your reasons.

Ans.—No; the intake air entering the mine should be conducted directly to the face of the live workings and never permitted to circulate through abandoned portions of a mine before reaching the working face. An air current passing through abandoned places will absorb the impure air and gases generated therein, which would render it unfit for circulation in the live workings where men are employed and fresh air is required to make the places healthful and safe for work. It frequently happens that explosive mixtures are generated in abandoned workings and would be carried by the air current passing through such sections and ignited by the lamps of the miners at work at the face, if the air current is first permitted to pass through the old workings.

Ques.—If a water gage, placed in a door 6x8 ft., shows a reading of 2 in., what is the total pressure on the door?

Ans.—A water gage of 2 in. corresponds to a pressure of $2 \times 5.2 = 10.4$ lb. per sq. ft. The area of the door, in this case, is $6 \times 8 = 48$ sq. ft., and the total pressure on the door is, therefore, $48 \times 10.4 = 499.2$, say 500 sq. ft.

Ques.—What method of ventilation lessens the dangers of an explosion and reduces friction? State your reasons.

Ans.—The split system of ventilation divides the air current into two or more separate splits, each split passing through a separate section of the mine. This system reduces the danger of an explosion occurring in the mine, because the air travels at a less velocity, carries less dust, and is not as liable to form an explosive mixture as when the mine is ventilated by one continuous current. Should an explosion occur in one district of the mine, there is less liability of the effect being extended to other sections; in other words, a possible ignition of gas or dust in one section is generally localized.

The split system of ventilation also reduces the frictional resistance of the mine, because the same quantity of air is circulated at a greatly reduced velocity and the resistance varies as the square of that velocity. Thus, for the same amount of rubbing surface in the mine, an air current traveling in two equal splits will meet with one-fourth the resistance offered when the same volume of air is circulated in a single current.

Ques.—Describe your action, as mine foreman, in case of a fatal accident taking place in a mine under your charge.

Ans.—Immediately on being notified of the accident, summon a physician by messenger or telephone and give orders for the ambulance to be brought to the mine and the necessary stretchers, blankets, and first-aid supplies taken in to the place. Then hasten to the scene of the accident and see that every effort is made to rescue the victim, never assuming that the accident is fatal till that is assured. In a properly organized mine, one or more members of the first-aid team will already be on hand and doing what he can when the foreman arrives on the scene. The foreman should at once take charge, however, and see that every possible help is rendered to rescue the victim and save his life.

The foreman must note carefully all the conditions surrounding the accident, so as to enable him to make a correct report and give true evidence bearing on the case when that is required. The names of the witnesses of the accident, if any, and of those who arrived later on the scene must be carefully recorded. As quickly as possible, the victim must be removed to a safe place and fresh air, in the hope that life may not be extinct, while taking every precaution to stop the flow of blood and prevent further injury by reason of broken bones. To avoid this, the man must be lifted and transported with all possible care.

After the accident, the foreman must make a full report of the same, in writing, to the inspector and the officials of his company, stating the nature, place, and time of the accident and the result, together with the name, nationality, occupation and age of the victim and whether he was married or single and the number of children or dependents in his family.

QUES.—Which, in your opinion, should be the larger, the upcast or the downcast, and why?

ANS.—The upcast shaft of a mine should have a larger sectional area than the downcast when considering the requirements of ventilation alone. The same applies also to an upcast slope. In respect to ventilation, the larger sectional area of the upcast is required by the expansion of the volume of the return current, caused alike by the heat of the mine, the relief of the pressure due to the mine resistance and the presence of gases generated in the mine, all of which increase the volume of the return air.

It may happen, however, that where the downcast shaft or slope is obstructed by hoisting operations and the upcast is free and unobstructed, the sectional area of the downcast may require to be larger than that of the upcast in order not to interfere with the adequate ventilation of the mine.

QUES.—Which is the safer and more reliable system of ventilation, mechanical or natural ventilation? State why.

ANS.—Mechanical ventilation is always safer and more reliable than any form of natural ventilation, for the reason that the latter is subject to changes in atmospheric temperature or pressure and other natural conditions that affect the ventilation of a mine.

Ques.—How would you determine the quantity of air passing where the section of the airway is 6 ft. high and 12 ft. wide?

Ans.—Assuming the dimensions given represent the clear cross-section of the airway, giving a sectional area of $6 \times 12 = 72$ sq. ft., it is necessary to ascertain the average velocity of the air current passing this point, by means of an anemometer. If the reading of the anemometer, after being exposed to the current for one minute is, say 600, indicating a velocity of the air of 600 ft. per min., the volume of air passing is $72 \times 600 = 43,200$ cu. ft. per min.

Ques.—Under what conditions would you recommend the use of mixed lights in a mine?

Ans.—Under no conditions whatever should mixed lights be recommended or permitted in a mine. The presence of open lights in a mine requiring the use of locked safety lamps introduces an element of danger and should always be avoided if not prohibited by law, except possibly on a section of the main intake airway, for the use of motormen or drivers.

Ques.—What safety appliances should be kept and maintained at the surface landing where workmen are being lowered or hoisted out of a mine?

Ans.—The surface landing at a shaft mine should be protected with automatic safety gates arranged to rise and fall with the cage. There should also be safety blocks to prevent cars from being run into the shaft. Some form of overwinding device should be installed to lessen the danger of overwinding. The hoisting rope should be plainly marked in a conspicuous manner to indicate the approach of the cage to the landing. An alarm whistle in the engine room arranged to warn the engineer that the cage has reached a point where the steam must be shut off and the brakes applied might often prove of advantage. However, no reliance should be placed by the engineer on such warnings; he should depend solely on his own vigilance.

An automatic device for shutting off the steam and applying the brakes to the winding drum, at the proper moment, might prove very effective in case an engineer was stricken and rendered helpless at the critical moment when hoisting men. At the head of slopes where men are hoisted, the same safety blocks should be installed to prevent trips from running down the slope before the cars are made fast to the rope or the engineer is ready to lower them into the mine.

Ques.—What dangers may arise from the improper assembling of a safety lamp?

Ans.—When a safety lamp is improperly assembled, there is

every opportunity for gas-charged air to be ignited by the lamp, since the flame is no longer isolated from the atmosphere surrounding the lamp. The improper assembling of the parts will generally leave small apertures or crevices through which flame can pass from within the lamp to the outside atmosphere. Such a lamp is more dangerous than an open light for the reason that it invites a trust or confidence that the miner would not have when using an open light in a mine generating some gas.

Ques.—Assuming there is 30,000 cu. ft. of air per minute entering a mine, how will this volume be affected by the temperature being raised 20 deg. while the atmospheric pressure remains the same?

Ans.—Assuming the temperature of the intake air is 60 deg. F. at the point where the measurement is taken, a rise of 20 deg. in temperature, under a constant pressure, will increase the volume in the ratio of the absolute temperatures. The absolute intake temperature is $460 + 60 = 520$ deg. F. A rise of 20 deg. will then give an absolute temperature of $520 + 20 = 540$ deg. F. Therefore, the given volume will be increased in the ratio 540 : 520, and the resulting volume is $(30,000 \times 540) \div 520 = 31,154$ cu. ft. per min., nearly.

Ques.—In a mine employing 250 persons, each person being allowed 200 cu. ft. of air per min., give the total volume of air required in a day of 10 hr., in cubic feet, and its weight in tons, the temperature being 62 deg. F., and the barometric pressure 30 in.

Ans.—The total volume of air required in this mine in a day of 10 hr., allowing 200 cu. ft. per min. to each person, will be $250 \times 200 \times 60 \times 10 = 30,000,000$ cu. ft. per min. At a temperature of 62 deg. F., and a barometric pressure of 30 in., the weight of a cubic foot of air is

$$w = \frac{1.3273 \times 30}{460 + 62} = 0.0762 \text{ lb.}$$

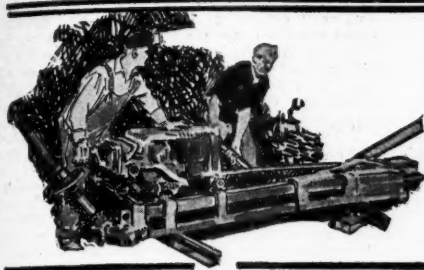
The total weight of air circulated in 10 hr. is, therefore, $(30,000,000 \times 0.0762) \div 2000 = 1143$ tons.

Ques.—What important principles must be observed in the robbing of pillars?

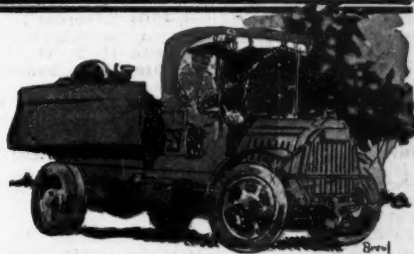
Ans.—The mine map should be consulted and a careful study made of the situation to ascertain what effect the extraction of the pillars will have on the surface and the adjoining workings in the mine. Due consideration must be given to the depth of cover and the nature of the overlying strata and whether withdrawing the pillars will cause a large inflow of water or gas into the mine.

Only experienced men must be employed in the work of robbing pillars. If gas is present in the overlying strata, only safety lamps must be used and care taken to keep these where they will be safe. Sufficient timber must be used behind the workmen to protect them from a sudden fall and to give warning of any undue movement in the roof. Regard must be had to the condition and size of the pillars to be drawn and care must be taken to keep the line of pillar work uniform and straight, so as to avoid any undue weight coming on the ends of the pillar. Two rows of posts should be kept behind the workmen and no timber left standing in the waste. As the rear posts are drawn, these or other posts must be set nearer the face of the coal.

When drawing pillars, it is important to see that the roof breaks and settles uniformly on the waste, in order to avoid an undue pressure being thrown on the end of the pillar, which would crush the coal or render the work of mining more difficult. A careful watch must be kept to detect any slips or breaks in the roof over the pillar, taking due precaution to prevent a sudden fall catching the workmen, who must always keep a way open and clear for escape.



COAL AND COKE NEWS



CHARLESTON, W. VA.

Movement of miners back to the mines. Effort made in District No. 17 to avoid court instructions to return to work. Pre-arranged plan to remain out. Miners of New River field (District No. 29) in the main return to work. Plentiful car supply. Miners in Kanawha field object to working while troops remain in the region.

Interest largely centered in this section of the state as elsewhere in the movement of miners back to the mines, and in that respect operators were partly disappointed, insofar as there was any general response to the order rescinding the strike call and directing the men to return to work. It was apparent that in the southern part of District No. 17 an effort was being made to avoid, insofar as possible, the instructions of both the Federal Court and of national officials of the United Mine Workers to return to work, and that district officials were a party to the delay of miners in reporting for duty, using one pretext and another as an excuse for the slowness of the men in returning.

As a result of this dilatory policy, production (on Thursday, Nov. 13) was still at a rather low ebb in a part of District No. 17, not including, however, the northern West Virginia fields. In the first place district officials had delayed somewhat in sending out official notices supplementing the telephone and telegraphic instructions given in a half-hearted way. On Wednesday, Nov. 12, not more than five per cent of the miners in this immediate section were at work. However, as the week progressed there was a gradual return to work.

It was believed in many quarters that the reluctance of the men to return to work was inspired, as a part of a pre-arranged plan to remain out as long as possible, and yet to seem to avoid any violation of the court order. This pending the result of the conference at Washington between representatives of the operators and miners of the central field, set for Friday, Nov. 14. West Virginia operators had been invited to this conference, the invitation, however, was not accepted by operators in the southern part of the state.

A large number of cars awaited the resumption of operations along the Chesapeake & Ohio, having been accumulated during the strike and during the few days following the official termination of the strike. In sharp contrast to the slowness of miners in District No. 17 returning to work, was the general response to orders in District No. 29 (embracing the New River smokeless field) where, with a plentiful car supply, miners were rapidly reporting for duty. More coal was moving to eastern points than had been the case during the first ten days of the strike.

Miners in District No. 29 responded to the order to go back to work, even though troops were stationed in the district; in fact the troops were quartered in the same building at Beckley occupied by the district officers of District No. 29. Operators expressed the opinion that on Nov. 13 at least 60 per cent of the miners of the New River field, or about 7,200 miners in all, had returned to work; operators hardly expecting such a prompt response in view of the slowness of the miners in other fields. It was also estimated that within two days after the strike had been called off, coal was being produced at the rate of about 75,000 tons a week,

and it was predicted that the output would reach normal again by Nov. 19. With the resumption of operations, shipments were being forwarded to the usual customers of New River operators, government prices on spot coal still being in force.

Refusal of the miners to return to work in larger numbers in the Kanawha district during the week, following the termination of the strike, was attributed (by F. C. Keeney of District No. 17) to the presence of troops in West Virginia, Keeney stating that the miners regarded this as an effort to force them to return to work under duress. His statement was made in the face of the fact and after an announcement had been made in the press by both Governor Cornwell of West Virginia, and General Leonard I. Wood, that troops would be withdrawn as soon as the necessary arrangements could be made. Keeney wanted to know the definite date. That information was not vouchsafed him or to anyone else. Keeney expressed the belief that miners in the Central Competitive states would not return to work until after negotiations had been consummated at Washington.

While officials of the United Mine Workers of District No. 17 claimed that 50 per cent of the 12,000 miners in the district had returned to work by Nov. 13, Secretary D. C. Kennedy, of the Kanawha Operators' Association, said that not over 35 per cent had reported for duty; so that coal was being produced only at the rate of about 50,000 tons a week or about 8,000 tons a day during the last three days of the period ended Nov. 17. Empty in large numbers awaited the resumption of operations at various mines in the district, railroads having generally prepared for quick resumption.

FAIRMONT, W. VA.

Events following order directing miners to return to work. Work resumed with 25 per cent of full working force. Some 300 cars loaded for week ended Nov. 12. No violence during the strike. Coal held for distribution to essential points.

It was not until Thursday, Nov. 13, that there was any general response to the order directing miners to go back to work. On that date fully one hundred mines on the Monongahela division of the Baltimore & Ohio had resumed operations, with about 25 per cent of the full working force of men on hand. On the day previous, however, 74 cars of coal were loaded. Operations had been resumed at none of the mines on the Morgantown & Wheeling R. R., in Monongalia County, however, by the thirteenth, and it was regarded as certain that there would be few men at work at the mines in question until about the nineteenth. Only three mines on the Monongahela R. R., in West Virginia, were reported as being in operation by the thirteenth, although four carloads of coal were loaded on the twelfth. However, no general resumption of operations at mines on this particular road was expected much before the nineteenth. Six mines on the West Virginia Northern R. R. were being operated on the thirteenth, there were only six mines out of the 22 on the Morgantown & Kingwood R. R. in idleness on the thirteenth, and the prospects seemed bright for a resumption of operations by Friday, Nov. 14, 31 cars having been loaded on the twelfth.

In many instances locals did not receive official instructions to return to work until Thursday morning, and in

other instances instructions had not been received up to that time. Six mines on the Western Maryland, in the Elkins district, were being operated on the thirteenth, and the prospects were good for a resumption of operations during the remaining days of the week. Three-fourths of the mines on the Coal and Coke R. R. were in operation by Thursday, the thirteenth, producing anywhere from 25 to 50 per cent of their normal output.

For the week ended Nov. 12, the production amounted to 800 cars, there being, of course, a 100 per cent car supply. Operators are unwilling to hazard a guess as to the labor supply, the strike having materially complicated matters. In other words as soon as it became certain that there was to be a strike, miners began leaving the Fairmont region, and during the strike others followed suit. It is believed that when conditions become conducive to a full resumption of operations it will be apparent that there is a quite serious labor shortage.

At no time during the strike was there any violence in any part of northern West Virginia; although at several scattered points in the northern territory, there are veritable hot-beds of anarchy; furthermore there has been much agitation among the miners at such points by Russians and Italians particularly at Star City, Wendel and Grant Town, with considerable propaganda in circulation.

Coal from the Fairmont field, up until the latter part of the week, was being shipped to no particular destination; the B. & O. having held within the division (for the ten or eleven days of the strike) all coal loaded, for such distribution as the railroad might see fit to make.

HUNTINGTON, W. VA.

Record output from Logan field during first week of strike. Miners stick to posts under protection of troops. Production maintained during second week of strike. Daily loading 800 cars. C. & O. tonnage of last week of October and first week of strike compared.

With transportation conditions highly favorable to a large production, the mines of the Logan field were able to produce coal, during the week ended Nov. 8, at the rate of 240,000 tons, about the highest point of the year. Indeed the output had reached the maximum figure for the year, being 84 per cent of capacity, with car shortage losses amounting to only 11,000 tons, or about four per cent. The labor shortage loss was somewhat larger, reaching a total of 14,000 tons; but miners were sticking to their posts more closely than at any time in recent months, and, with United States troops to protect them from outside interference, were unmolested. During the presence of troops at Clouthier, no attempt of any kind was made to go ahead with organization plans, thus permitting non-union miners to proceed with their work without interference or intimidation.

During the week ended Nov. 17, insofar as it could be estimated, production was still being maintained at the same high level; cars were loaded at the rate of about 800 a day and over, or about 40,000 tons a day, with cars ample for all needs. For instance, on part of the week in question, practically all Logan coal was being routed westward and was being distributed by the Chesapeake & Ohio at Russell, Ky. During the strike such coal as was needed by the C. & O. R. R., was supplied by Logan mines.

A comparison of the tonnage handled by the C. & O. during the week preceding the strike and during the first week of the strike, is highly interesting as showing the extent to which production at mines on the C. & O. was affected. Cars handled for the week ended Nov. 1 amounted to 13,506, and during the following week, 6,324. A comparison by districts in terms of cars is given below:

District	Week End, Nov. 1	Week End, Nov. 8
New River	2706	374
Kanawha	2663	228
Coal River	1072	10
Logan	4585	4728
Kentucky	1489	551
Sandy Valley & Elkhorn	674	147
Long Fork	256	232
Ashland Coal and Iron	61	54

VICTORIA, B. C.

Mines of Vancouver Island, provincial mainland and Alberta Province not affected by miners' strike in United States. No greater coal shipments to this country than usual. Puget Sound steamships bunkered as usual.

The present prospects are that the bituminous mines of British Columbia will not be affected by the strike in the United States. All the collieries of Vancouver Island, as well as those of the provincial mainland, are working as usual and there are no reports of impending trouble. The same applies, up to date, to the mines of the Province of Alberta.

It was reported some days ago that the State of Washington would look to British Columbia to replenish its empty coal bins, the assertion being made that 10,000 additional tons would be shipped to the Sound every month in order to assist in overcoming any shortage that might develop.

This caused some uneasiness in this province, it being felt that it might result in industrial and domestic embarrassment at home. J. M. Savage, manager of the Canadian Collieries, Ltd., has stated that his company would make no greater shipments to the United States than usual for the simple reason that it was not in a position to do so. He said that the local demands were so heavy that the company was fully occupied taking care of them. Certainly the local market would have to be cared for before export was considered. Much the same statement was made by W. A. Webb, of the Canadian Western Fuel Co., which operates the Nanaimo Collieries who added that the State of Washington could not look for more coal than now was being sent out because it was outside the capacity of the company to make such deliveries. Consequently those who were inclined to dispute a policy of permitting export of coal at the present moment apparently have been silenced.

The bunkering of steamships sailing from Puget Sound ports will not be affected. Most of these vessels call at Nanaimo for their fuel. The Nippon Yusen Kaisha and Osaka Shosen Kaisha vessels will be able to obtain coal from Sound bunkers which are filled from Vancouver Island mines.

PENNSYLVANIA

Anthracite

Hazleton—The Lehigh Valley Coal Co. has coupled up the new 1,200-h.p. boiler plant which will run the pumps installed to take the water out of the Stockton mines, flooded for 30 years, but now scheduled to be reopened and operated from the Hazleton Shaft colliery, one-half mile west of the Stockton slopes.

Hazleton—The citizens of this place are protesting the lack of coal available at the Lehigh Valley, Hazle Mines colliery. The breaker works seven hours daily and for the past month all production has been sold in the city.

Hazleton—On account of the decreased production of bituminous coal, the railroads running through the anthracite coal regions are preparing to burn hard coal again on their locomotives. Furthermore steam sizes are in such demand, that banks of coal, which have stood idle since the war ended, are now being sent to the breakers.

Drifton—The breaker of the M. S. Kemmerer Co. at Sandy Run, near here, is being remodeled and soon will be placed in operation after a long idleness.

Upper Lehigh—Pumps drowned out for many years were recovered in good condition, when the No. 2 slope of the Upper Lehigh Coal Co. was dewatered by electric pumps installed recently. The slope, long closed, will be reopened and the Buck Mountain seam will be reworked.

Bituminous

Connellsville—The Union Coal and Coke Co., of Pittsburgh, has purchased from Annie E. Fulton, 196.38 acres of coal in Amwell Township, Washington County, Penn., for \$63,823.50; and from Emma B. Stewart 137.173 acres in the same township for \$44,581.33.

WEST VIRGINIA

Fairmont—The plant the Domestic Coke Corporation, of Cleveland, is building near here, is expected to be completed by Jan. 1 next. This plant, which will consist of 60 Koppers ovens, will mark a departure in by-product plant operation in that the gas produced will be applied to augment the natural supply in the vicinity of the plant.

OHIO

Steubenville—Three large stripping operations in the eastern Ohio field, which have not been unionized, are still in operation according to reports. They are: The Wayne Coal Co., which has headquarters in Pittsburgh; the Superior Coal Co.; and the Harmon Creek Coal Co. The capacity of the three concerns is about 6,000 tons daily, but it is doubtful if they are being operated at capacity.

INDIANA

Bicknell—American, No. 1 Mine, one of the largest bituminous coal mines in the country which was discovered on fire recently, has been sealed up. The mine is electrically equipped. Ordinarily 856 men are employed in the mine and it has a capacity of 6,000 tons of coal daily. Only 21 men including pumper and engineers were in the mine when the fire was discovered, and they were rescued. The cause of the fire has not been determined. The shaft probably will have to remain sealed for several months. Although the employees of the mine are on strike, more than 100 gathered about the shaft as soon as the alarm was sounded, and volunteered to fight the fire, as evidence, they said, that they had no connection with the fire.

ILLINOIS

Centralla—Excavation has been started for a \$200,000 coal briquetting plant on the property of the Olympic Coal Mining Co., nine miles northeast of this city. Most of the machinery for the plant is already on the ground and it is expected operations will begin about the first of the year. The main building will be 67x40 ft. in size and will have a daily capacity of 400 tons. The owner of the new plant is the Centralla Briquetting Co. The company plans to erect a second plant within twenty miles of this city.

Decatur—The Decatur Coal Co., of this place is installing Sullivan electric mining machines at its plant. The company is mining a 4-ft. seam. At present gasoline motors are used on haulage roads. This company's Uiantic mine had a disastrous fire in June which destroyed the surface plant, since which time the mine has been idle. However, reconstruction is now being pushed. D. W. Beggs is superintendent and E. A. Clarke, mine manager.

Du Quoin—Three of the miners' unions of this city, employed at the Security, Paradise and Majestic mines, have recently closed a deal through their officers whereby they acquire a title to the Lemp Building, on West Main street, for a consideration of \$5,500. The building, which is in good

condition and in the heart of the business district of the city, will be occupied in the lower story by the miners' co-operative store which was established several months ago and which is now one of the most liberally patronized concerns of the city. The second story will be remodeled and will be occupied by the miners of Du Quoin as labor headquarters. Du Quoin now has a total membership in the various miners' unions of approximately 2,100 men.

The Western Coal and Mining Co., operating a mine at Bush, south of here, is planning to open a plot of land near its mine for the purpose of building houses for employees. The company has been greatly handicapped during the last two years on account of the scarcity of men and it is believed that this plan will relieve the situation.

The general sales office of the Union Colliery Co., operating the big Kathleen mine five miles south of here, has been moved from St. Louis, to Plymouth Building, Chicago. Eugene McAuliffe is president and H. A. Lawrence is sales manager of the company.

KANSAS

Pittsburg—The Western Coal and Mining Co., of this place, will start hoisting coal out of its new mine, No. 20, within a few days. The mine is a shaft development and its capacity will be 1,500 to 2,000 tons per day. It is said that electrical haulage will be installed as soon as sufficient development warrants this change.

OKLAHOMA

McAlester—A little more than \$100,000 worth of segregated coal and asphalt land was sold on the first day of a three-day sale of Choctaw and Chickasaw Reservation. Gabe E. Parker, superintendent of the five civilized tribes, explained that investors were holding off for the next sale, ordered to be held within six months, when the mineral deposits will be sold to the highest bidder instead of at appraised value or higher, as now.

The sale disposed of only six of the 960 tracts in holdings valued at close to \$14,000,000.

Of the six buyers, all except one were from other parts of the country. They are as follows:

Seth S. Serat, Kansas City, Mo., purchased tract 79 for \$26,425.45 in LeFlore County.

The Superior Smokeless Coal and Mining Company of Chicago purchased tract in LeFlore for \$31,870.

The Continental Asphalt and Petroleum Company of New York purchased tract in Murray County for \$9,600 and tract in Carter County for \$5,400.

D. C. McAlpine of Halleyville purchased tract south of Savanna in Pittsburg County for \$17,554.80.

Earl Cobb, of Amarillo, Texas, purchased tract south of Savanna in Pittsburg County, for \$17,554.80.

Personals

Charles Beldleman has resigned as outside foreman at the G. B. Markle Co. No. 4 Colliery and will go with the Leggets Creek Coal Co., at Scranton.

J. A. Thomas, consulting fire engineer who was called to New Haven, Conn., to extinguish a fire in a coal pile at the Winchester Repeating Arms Co., announces that he has been successful. He has been called to Waterbury, Conn., to extinguish a like fire at the Scovill Manufacturing Co.'s plant.

Alexander Macomber and **John West**, since 1910 with Charles H. Tenney & Co., engineers and managers of public utilities, have become associated with **George P. Carver**, industrial architect and engineer, formerly at 53 State St., Boston, Mass. Engineering problems from inception to completion will be handled by the firm of Carver, Macomber & West, Inc., with offices at 261 Franklin St., Boston, Mass.

Harry Culley, of the Peabody Coal Co., West Frankfort, Ill., has been transferred by his company from West Frankfort to its operations in Oklahoma.

George Thomson, for several years head of the Thomson Coal Co., of Chicago, has retired from the coal business and gone into the phosphate mining business in Tennessee. The Chicago, Wilmington and Franklin Coal Co., owners of the Orient mine in Franklin county, Ill., which has the world's record for hoisting, recently purchased the mines formerly under the control of Mr. Thomson.

S. B. Eaton, of Du Quoin, Ill., formerly a coal operator of southern Illinois, having retired from the trade, has left for California where he expects to make his home. Mr. Eaton developed and operated a number of mines in Perry county and held responsible positions with various companies.

Russell W. Stovel—who recently returned from France, where, as Lieutenant-Colonel of Engineers, he served as Chief of the Terminal Facilities Division of the Army Transport Service—has been appointed a consulting engineer of Westinghouse, Church, Kerr & Co., Inc., and, as a member of that organization, will devote his entire time to the company's electrical and mechanical work. Mr. Stovel has had an unusually comprehensive experience in the electrical and mechanical problems connected with central power station and steam railroad electrification work—from the fundamental economics involved, to design, construction, equipment and operation—together with a most valuable experience in mechanical handling at docks and terminals.

Charles F. Scribner, formerly industrial engineer with the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., and more recently consulting engineer for L. V. Estes, Inc., Chicago, has become associated with the Business Service Corporation of America, Chicago Ill., in the capacity of vice president and chief engineer.

Daniel E. Russell, vice president and general sales agent of the Delaware, Lackawana & Western Coal Department from 1901 to August, 1918, died suddenly while on a visit to Buffalo, N. Y., on Nov. 18, at the age of 56. Since retiring from the coal trade he had lived in his old home at St. George, New Brunswick, where he was born. He had been in a variety of occupations, including railroad building, lumber and village construction, having erected many of the homes in Depew, near Buffalo, for the Vanderbilts. At one time he was in the soft-coal trade in Chicago under his own name. When ordered to Buffalo he was shipping agent of the D. L. & W. at Hoboken.

C. W. Cross has been appointed by the Chicago Pneumatic Tool Co., as manager of Western railroad sales, with headquarters in the Fisher Bldg., Chicago.

H. W. Shields was appointed acting general manager of the Pocahontas Coal and Coke Co., to relieve W. W. Coe, general manager, who has been temporarily relieved from the duties of his office on account of illness. Mr. Shields will retain his office as land agent at Bluefield, W. Va.

Catalogs Received

Typical Examples of Lea-Courtenay Centrifugal Pumping Machinery. Lea-Courtenay Co., Newark, N. J., Bulletin S-5. Pp. 28; 3½x6 in.; illustrated. Concise description of a few of the types of centrifugal pumping machinery made by this company.

Lea-Courtenay Centrifugal Pumping Machinery. Lea-Courtenay Co., Newark, N. J., Bulletin H-4. Pp. 67; 6x9 in.; illustrated. A description of the various types and sizes of Lea-Courtenay centrifugal pumps and their application.

Safe Practice in Using Wire Ropes in Mines. By R. H. Kindlich and O. P. Hood. Technical Paper No. 237. Department of the Interior. Bureau of Mines. Illustrated; 5½x9½ inches.

"Little David" Pneumatic Drills, Grinders and Saws. Ingersoll-Rand Co., New York, N. Y., Form No. 8707. Pp. 40; 6x10-in.; illustrated. Catalog describing drills, grinders and saws and some of their applications.

"Radolaxe" Coal Cutter. Ingersoll-Rand Co., New York, N. Y., Form No.

5106. Pp. 16; 6x9 in., illustrated. Describes and illustrates the type No. 47 coal cutter and shows the machine at work in various mines.

Decarbonizing Outfit. The Davis-Bournonville Co., Jersey City, N. J. A 4-page folder; 3¼x6¼ in.; illustrated. Description of outfit for burning out carbon deposits in gas engine cylinders.

Publications Received

War Gas Investigations. Bulletin 178-A. Advance chapter from Bulletin 178 War Work of the Bureau of Mines. By Van H. Manning. Department of the Interior, Bureau of Mines. Unillustrated; pp. 39; 5½ x 9½ inches.

Coals of the Region Drained by the Quicksand Creeks. By F. Julius Folis, Kentucky Geological Survey. Bulletin No. 13. Serial No. 25. Illustrated; pp. 79; 7 x 10½ inches.

Carbonization of Missouri Cannel Coals. School of Mines and Metallurgy of University of Missouri, Rolla, Mo. Bulletin Aug. 1919. Illustrated; pp. 52; 5½ x 8½ inches.

Industrial News

Charleston, W. Va.—Operations are to be conducted on quite an extensive scale, it is reported, in Malden district of Kanawha County, by the Davenport Coal Co., of this city, a new company with a capitalization of \$300,000. This concern was organized by Godfrey E. Heiser, of Orchard Park, N. Y.; Geo. J. Brendel, of Hamburg, N. Y.; Geo. R. Stephens, Lancaster, N. Y.; F. Maurice E. Preisch, Isaac S. Given, Elbert E. Johnston, W. E. Farnsworth, Lewis H. Manley and O. Davenport, all of Buffalo, N. Y.

Charleston, W. Va.—Headquarters have been established by the Kelly's Creek Colliery Co., as well as by the Valley Camp Coal Co., in Charleston, offices having been secured in the Kanawha Banking and Trust Co. Bldg. C. S. Paisley is the office manager. The Valley Camp Company was only recently organized.

Welch, W. Va.—The Link Belt Co., of Philadelphia, has just been awarded a large contract for the complete installation of a modern trolley and retarding conveyor by the Mohawk Coal and Coke Co., at Mohawk, W. Va. Col. L. E. Tierney, president of the Mohawk company, is also interested in a number of other modern collieries in West Virginia and Kentucky. In order to properly clean and prepare coal for market, this company decided to replace the present old structure, with a plant of the most modern design. The new equipment will include automatic machinery throughout for handling about 2,000 tons of coal daily from a seam at the top of the mountain or from one midway along the conveyor. The conveyor will deliver coal to a 750-ton coaling station or to the new tipples.

Louisville, Ky.—The Community Cannel Coal and Mining Co., of this place, has been incorporated with a capital of \$30,000. The incorporators are: L. L. Ogden, Charles H. Bastie and N. B. Mitchell. The debt limit is \$15,000. The company plans to operate mines in Kentucky and Indiana with main offices at Louisville.

Fairmont, W. Va.—The Winfield Coal Co. will establish operations in Winfield district, of Marion County, W. Va., this concern having just been organized with a capital of \$25,000. Plans are being made for early operations. Represented as incorporators were R. B. Satterfield, of Lumberport; G. B. Hartley, T. W. Powell, Alpha Orr and Paul G. Armstrong, all of Fairmont.

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Greensburg, Penn.—Fred E. Thomas, of Beaver County, has sold to Senator W. F. Blair, of Waynesburg, 888 acres of coal and timber land, near Ligonier, for \$65,000.

Waynesburg, Penn.—John Huffman, of this place, has sold a tract of about 278 acres of coal land near Tennille Penn., for \$350 per acre.

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Pana, Ill.—The mining plant of the Smith-Loehr Coal Mining Co., of this place, in Christian County, which was recently destroyed by fire, will be entirely rebuilt. A fireproof structure will be erected and modern equipment installed throughout. The Roberts & Schaefer Co., of Chicago, has been awarded the contract for the head frame, construction of which will be started immediately.

Huntington, W. Va.—The Wilson Thacker Coal Co., a \$50,000 corporation has been organized by a group of Huntington men for the purpose of developing holdings in Wayne and Mingo counties. The incorporators were: E. N. Pyle, A. R. Malers, P. K. King, John Bowman, and Walter C. Williams, all of Huntington.

Wheeling, W. Va.—The Arkwright Coal Co., of Elm Grove, has been incorporated with a capital stock of \$150,000. The incorporators are: T. S. Kilcorn, J. Arkwright and H. K. Roberts, Elm Grove; J. R. McCoy, Triadelphia; and J. Handlan, Wheeling.

Huntington, W. Va.—The Ohio Valley Mine Car and Manufacturing Co., of this place, which has taken over the Kyle Smith Aircraft plant, is negotiating for a considerable tract of land adjoining the aircraft property. The Ohio Valley company was recently incorporated for \$200,000 and decided to remain in Huntington on account of good shipping facilities, cheap fuel and other advantages offered here.

Indianapolis, Ind.—The White Ash Coal Co., of Jacksonville, was incorporated with a capital of \$50,000 for general mining purposes. The directors are: Gray Moss, John Mooney and Joe Fougousse.

Charleston, W. Va.—The Royal White Ash Coal Co., of Alkol, W. Va., was incorporated to operate mines in Lincoln County, with a capital stock of \$200,000. The incorporators are V. E. Hall, L. W. James and J. B. Coolidge, all of Dayton, Ohio.

Baltimore, Md.—The Black & Decker Manufacturing Co. announces the removal of its general offices from 105 South Calvert St., of this place, to Towson Heights, Baltimore.

Louisville, Ky.—The Perkins Bowling Coal Corporation of Williamsburg Whitley County Ky., has been incorporated with a capital stock of \$200,000. The incorporators are: N. B. Perkins, A. V. Brown and J. W. Bowling.

Charleston, W. Va.—T. E. B. Siler and others of this vicinity have organized the Posler Coal Co., which will operate mines on an extensive scale in the Kanawha field, this company having a capital of \$120,000. So far as can be learned construction work will be started in the near future on this plant. In addition to Mr. Siler, those identified with this company are: C. G. Peters, J. L. Silver, Fred O. Blue and R. E. McCabe.

Victoria, B. C.—The coal mines of the Crow's Nest Field (eastern British Columbia), are gradually being brought back to normal in point of production, although it need scarcely be said that it takes time to recover lost ground after a strike such as that through which the district has passed. The output now is about 80 per cent. of what it was and an improvement is being shown each month. The coke ovens at Fernie are idle and it is thought that they will remain so for some time. Those of Michel, B. C., are operating only on a limited scale, the demand for the product being comparatively light at present.

Canton, Ohio—The Columbia Coal and Power Co. has been chartered with a capital of \$75,000 to mine and sell coal. The incorporators are: L. D. Blanchard, F. E. Schumacher, M. M. Guiley, N. E. Wise and M. C. Anderson.

Hume, Mo.—A large strip mine is soon to be opened up south of here on the Kansas City Southern R. R. The developing is to be done by Joe Klaner, a coal operator of Kansas City. A large stripping shovel is now being placed on the ground preparatory to starting operations.

Buffalo, N. Y.—At a recent meeting of the board of directors of the Stewart Motor Corporation of this place, the regular quarterly dividend of 2 per cent was ordered paid, also a 2½ per cent dividend on the common stock. This company recently acquired larger quarters and the new 9-acre plant purchased is now in full operation. The progressive assembly system used in the new works should make possible a yearly production of 10,000 Stewart trucks.

Tarentum, Penn.—West Penn Power Co. recently awarded a contract for the sinking of a mine hoisting shaft on the right bank of the Allegheny river at Springdale, Penn.

Beckley, W. Va.—The Morris Smokeless Coal Co., of Tams, near here, has organized with \$200,000 capital. J. T. Morris is superintendent. The company has leased 1,625 acres of coal land and will install a mining plant with an annual capacity of 150,000 tons of coal.

Boomer, W. Va.—The West Virginia Eagle Coal Co. has been granted a charter with offices here. The capitalization being \$1,000,000. Several thousand acres of land have been purchased. The incorporators include: William G. Conley, of Charleston; E. A. Charlton and J. R. Charlton, of Macdonald, W. Va.; C. H. Martin and L. S. Tully, of Mt. Hope, W. Va.

Portage, Penn.—The Portage Collieries Co. has been organized by Paul Nelson, Wallace Sherbine and William Yeckley, of this place. This company will operate a mine on the Martin's Branch of the Pennsylvania R. R. in Cambria County.

New York, N. Y.—Announcement is made of the purchase of the Cataract Refining Co., of Buffalo, by the Swan & Finch Co., of this place. The Cataract Company operates large lubricant plants at Buffalo and Chicago, and maintains branch offices and warehouses in eight of the principal cities in this country besides four in England, Scotland and Canada. Henry Fletcher, former president of Swan & Finch Co., is chairman of the board of directors; W. G. Moncrieff, formerly president of the Cataract company, becomes president of the Swan & Finch Co.; H. C. Hutchins, vice president and director of sales; George Elliott Brown will be vice president and secretary, and John T. Lee, vice president and treasurer.

Birmingham, Ala.—Osborne & Company, Inc., of Chicago, are reported to have acquired 10,000 acres of coal lands in the vicinity of Lock No. 16 on the Warrior River. It is said that this company expects to begin development promptly with a view to beginning the shipment of coal via the Warrior to the gulf ports in the early part of 1920. C. S. Cochran, Chicago, is president of the company.

Philadelphia, Penn.—The Richardson Phoenix Co., of Milwaukee, Wis., (lubrication engineers and manufacturers) announces the reopening of its Philadelphia office in the Bailey Bldg. George F. Fenno is district manager.

New York, N. Y.—The new Gauley Coal Corporation has been organized to acquire and consolidate into one company the various interests controlling about 40,000 acres of Ganley coal. This property was formerly owned by the Tidewater Coal Co., the Lee-Higginson interests, the estate of the late Henry K. Wickland and the so-called Camden lands of the Baltimore & Ohio R. R. on the Gauley River in West Virginia.

Columbus, Ohio—The Eastern Hocking Coal Co., of this place, has been incorporated with a capital of \$110,000 by J. H. Frantz, F. C. Simpson, C. T. Marshall, Gordon Battelle, Harry M. Rinkie and W. R. Pomerene. The Eastern Hocking Coal Co. purchased all the coal lands belonging to the

National Hocking Coal Co. The consideration was \$1,500,000. The officers in the new Hocking company are: J. H. Frantz, Columbus, president; Attorney C. T. Marshall, Zanesville, vice president; H. M. Runkle, counsel, Cincinnati; Gordon Battelle, Columbus; W. R. Pomerene, Columbus, and A. F. Murphy, superintendent of the local plant of the American Rolling Mill Co. The property involved embraces 202 farms and covers 29 square miles of territory in Morgan, Perry and Muskingum counties. It is also said that a great power plant will be erected at the most available point.

Fairmont, W. Va.—Fairmont City Gas Coal Co. has been chartered by West Virginia and Pennsylvania men, who plan to develop extensive coal land acreages in this state. Its capital is \$500,000, and the investors interested include: Charles E. Hawkes, of Fairmont; A. J. Salzer, of Weston, W. Va.; Thomas E. Cunningham, of Connellsville, Penn., and S. J. Bartus, of Pittsburgh, Penn.

Phillippi, W. Va.—The latest addition to new coal concerns, organized for the purpose of producing coal in Barbour County, is the Wayne Steam Coal Co., which has a capital stock of \$75,000. This company hopes to be in a position to undertake preliminary construction work in the near future. Those behind the new concern are A. G. Newcomer, Dawson, Penn.; G. W. Newcomer, Connellsville, Penn.; Lon Cunningham, Bellevue, Penn.; H. R. Hurst and H. R. Parker, Scottdale, Penn.

Williamson, W. Va.—With a view to future operations in the Williamson field, Chattooy people have organized the Wanego White Ash Coal Co., with headquarters at Chattooy, this company having a total authorized capital stock of \$50,000. Active figures in the organization of the new company were J. C. Young, L. G. Bray, Andy New, Jr., H. V. Ingham and John H. Kidwell, all of Chattooy, W. Va.

Morgantown, W. Va.—Construction of a short line coal carrying road from the Flagg Meadow station of the Monongahela R. R. in Monongalia County, is presaged by the organization by S. D. Brady, a prominent Fairmont operator, and others, of the Gas Coal Railroad Co., with a capital of \$100,000. Organizers in addition to Mr. Brady were F. W. Byrne, of Everson, Penn.; Frank E. Peabody, L. P. Monoham and Eugene S. Reilly, all of Pittsburgh.

Charleston, W. Va.—Although an old established mining engineering firm, it was not until a few days ago that the firm of Clark & Krebs, became incorporated, with a capital stock of \$50,000.

Charleston, W. Va.—The Raleigh Smokeless Fuel Co., in which citizens of Beckley are the principal stockholders, has opened headquarters in Beckley where the general offices of the company will be maintained; the concern has a branch office at Norfolk with J. W. Miller in charge. The new company has perfected its organization with J. B. Clifton, as president and general manager, and with Francis L. Conway, as assistant to the general manager.

Charleston, W. Va.—A deal has been consummated under the terms of which M. F. Odell and E. A. Hall, of Beckley, have secured a lease on a large tract of coal land in Nicholas County, on Gauley River, not far from Summersville. The land leased is said to contain three workable beds of coal. An effort is being made by Messrs. Odell and Hall to secure additional tracts with a view to future development.

Bluefield, W. Va.—A part of the large acreage recently secured under lease by Thomas N. Mordue, president and treasurer of the Pinnacle-Pocahontas Development Co., has been leased to the Morris Smokeless Coal Co. The lease includes about 1,625 acres of No. 3 Pocahontas coal located on the main line of the Virginian Ry., near Herndon. It is the intention of the company to start construction work at once, on a model mining plant and town. In fact, the company expects to spend about \$200,000 on the plant with a view to securing a production of about 150,000 tons a year. It will be approximately three months before the plant will be ready for operation. Identified with the new company are

H. R. Tribon, W. P. Tams, H. O. Davis, J. W. Eads and G. L. Wilcox, all of Tams. Operations will be in charge of J. T. Morris.

Fairmont, W. Va.—Operations on a large scale are contemplated by the Fairmont Gas Coal Co., in the Fairmont field, this company having just been ushered into existence with a capital of \$300,000. Headquarters of the company will be at Fairmont. Principal figures in the organization are: Thomas R. Cunningham, Connellsville, Penna.; A. J. Salzer, Weston; S. V. J. Bartus, Pittsburgh, Penna.; H. H. Stagers, Charles E. Hawkes and Rolfe J. Conley, all of Fairmont.

Morgantown, W. Va.—Development on quite a large scale is to be undertaken in Monongalia County by the Soper-Mitchell Coal Co., which has just been organized with a capital stock of \$250,000. This company was organized by W. H. Soper, W. R. Mitchell, R. M. Kirby and John E. Everly, all of Morgantown, W. Va., where headquarters of the company have been established.

Logan, W. Va.—The Island Creek Coal Co. has awarded a contract to the Walter Sudduth Co., of Princeton, for the construction of four and a half miles of railroad on Mud Fork of Island Creek, in Logan County and also for the grading for track in connection with four new operations of the company.

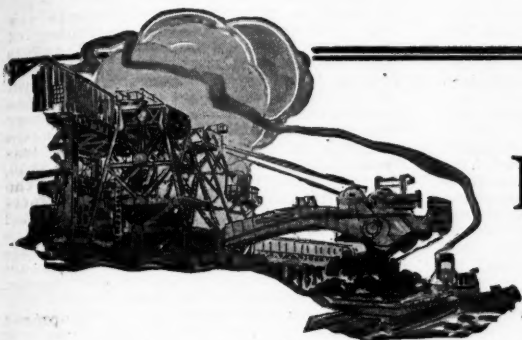
Charleston, W. Va.—Coal men, with mines on Coal River, have heard with considerable interest of the plans of the Chesapeake & Ohio to improve facilities for handling Coal on Coal River, by the establishment of terminal facilities and yards at Danville where it is stated \$5,000,000 will be expended in improvements. The initial appropriation will be \$1,000,000 but improvements will not be undertaken it is believed, until after the railroads are restored to their owners. Tracks, shops and all other improvements will be put in at the new Danville terminal whenever work is started.

Tams, W. Va.—Extensive coal holdings in Wyoming County are being secured by Major W. P. Tams, of this place. One tract of 3,000 acres of coal land (known as the Saunders farm) five miles from Oceana, has been secured by Major Tams, the consideration being \$180,000 or at the rate of \$60 an acre. Major Tams has also acquired 1,100 acres on Simmons Fork, and 1,300 acres on Clear Fork, the several purchases representing an investment of approximately \$250,000.

Clarksburg, W. Va.—Resort to the sinking of shaft mines may become necessary in view of the rapid development of coal lands in this county was ment in the Harrison Co. field. When the development of coal lands in this county was first undertaken—in fact up to a few years ago—the necessity of mining coal through the use of shafts was considered a remote possibility. Development has been at such a rapid rate, however, that shafting seems to be imperative and even now several companies are preparing to develop properties by this means. The Hope Natural Gas Co., and the Alpha Portland Cement Co. are, for instance, driving a shaft 100 ft. in depth at the Wolf Summit and it is said that this is the forerunner of other work of a similar nature.

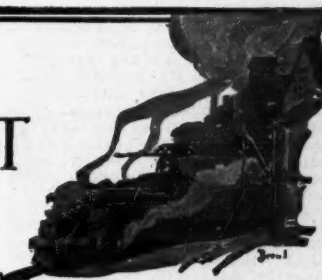
Charleston, W. Va.—Splendid progress is being made on the large byproduct plant of the Domestic Coke Corporation of this city, the \$4,000,000 plant now nearing completion, covering 50 acres in scattered buildings. Six hundred men are now at work on the plant. The operation includes 60 coke ovens, a byproduct building, coke wharf, three pump houses, storage tanks for light oil and a benzol building. The battery of 60 coke ovens reaches a height of 37 ft. above ground level and extends 280 feet in length. The byproducts building, 60x137 ft. in dimension, is about half completed. The benzol building under construction measures 60x100 feet.

Charleston, W. Va.—Coal lands on Meadow Creek are now undergoing rapid development with six coal companies in operation, at what is known as Meadow Bridge. In order to provide an adequate power supply for the mines, the Virginian Power Co. is extending its transmission line from Laurel to Meadow Bridge.



MARKET DEPARTMENT

EDITED BY ALEX MOSS



Weekly Review

Operators and Leaders of the United Mine Workers Unable to Agree on Wage Scale—Few Miners Return to Work—Anthracite Output Normal

Operators and miners' leaders of the central competitive district are deadlocked in their efforts to negotiate a new wage scale that will be satisfactory to all concerned. Naturally this makes for decided uncertainty. Surprising as it may seem, no cessation of industry, because of a lack of coal, is reported, though if the present situation continues for a week or two longer the reverse will be true.

Though the strike has been called off, few miners have returned to work. The non-union districts are all working, and some are producing practically record tonnages.

Production of soft coal during the week of Nov. 8 is estimated at 3,477,000 net tons. This was the output of the non-union fields. Mines in the central competitive district, which includes Illinois, Indiana, Ohio and western Pennsylvania, were shut down.

Anthracite output is at top-notch figures. Demand is keen for all the domestic sizes. No real scarcity is expected, for operation is normal. During the week ended Nov. 8 the quantity of anthracite shipped to market totaled 1,972,000 net tons.

Atlantic Seaboard

BOSTON.

Steam trade marking time. New England comfortably supplied for the present. New machinery of distribution functioning slowly and procedure not yet well understood. Toward the latter part of the week coal released at loading piers for specific requirements. Local conservation measures. Anthracite situation unchanged. Retail prices in Boston advanced.

Bituminous—The first week of the strike has shown an almost entire absence of any developments in New England. No real anxiety has as yet come to the surface and as a whole the steam trade is marking time throughout this territory. It is realized that stocks are ample for the next 60 days at least, and the few applications that are understood to have been made for emergency supplies were from consumers who were beginning to worry over the possibility of coal they had in transit being taken for other requirements. So far there has been no confiscation or summary diversion of coal en route or at destination; the railroads have simply withheld deliveries as a matter of prudence, acting under instructions from Washington. These measures have created hardly a ripple, thus far, although there are many in the trade who cannot follow such a policy. It continued more than a relatively short time. There are a great many non-union mines in operation and if cars are not released there are likely to be tendencies toward a car famine. Such a result would not be in the interest of conservation.

A thorough combing over would probably disclose only a comparatively small number of consumers who are not amply supplied. Most of these cases would sift down to instances where small plants rely upon retail deliveries from day to day, and in certain localities along the coast the retail dealers are somewhat embarrassed because of the lack of barges due to the striking marine engineers. Even these retailers, however, anticipated early in October and if they are allowed to unload their own coal now at destination or en route, by far the most of the urgent cases would be taken care of in short order.

There is a good deal of vagueness as to the Regional Committee and how it is supposed to function. It is not yet understood who really constitutes

the committee which is assumed to have jurisdiction over distribution. A news dispatch from Washington published as this is being written indicates that Mr. J. J. Storrow will represent the Fuel Administration. This is more nearly in line with the proprieties than earlier rumors, for to experiment now with so delicate a situation as may follow would certainly be anything but wise. The official blanks are not yet available in Boston, and generally there has been a lot of needless delay over announcing a program, but it is hoped now that within a few days the trade will be able to get a better idea of policy than has yet been unfolded.

At the New York and Philadelphia piers there has been nothing like the same delay. Coal was being released at both these ports and at Hampton Roads by Nov. 3rd. It was possible during the week for any real emergency to be met promptly by applying through railroad channels. There are certain details that are not made clear, but action was had and steamers and barges were not held up to the extent that was feared. Except for bunker and cargo coal for foreign-owned ships there has been little delay the past few days and with the Pocahontas field marking up a record production there is a good deal of optimism over the current situation.

Under Gen. Sherburn, who is chairman of the Massachusetts Commission on the Necessaries of Life, prompt action was taken to conserve present stocks of bituminous by instructing retail dealers to deliver $\frac{1}{4}$ screenings with soft coal and to restrict deliveries by team to not more than a week's supply for any one consumer. The retail dealers were cheered by this for there is a considerable tonnage of steam size anthracite on hand left over from the stressing times of early 1918. At the same time it was forbidden to make deliveries of pea coal for industrial steam use.

There is little news on prices. Mines that are in operation are disposing of output under the legal price rules but the volume of such sales is small. In such cases, contracts are being followed so far as possible and there is already some encouragement for the feeling that the strike situation will be over within a reasonable short time.

Anthracite—There is still much anxiety over getting forward domestic sizes for winter consumption. Cities like Providence, Boston, and Portland have been very well served, and for the greater part the all-rail movement has been heavy. The communities that

suffer most are those along the coast to the eastward where dependence is placed upon barges that are still tied up, awaiting adjustment of difficulties with marine engineers. Part of the demands have been waived and it is hoped this will forecast a complete settlement.

Effective Oct. 27 retail prices in Boston were advanced from \$12.50 per net ton delivered for egg, stove, and chestnut. Broken is still sold at \$12 and pea at \$10.75.

NEW YORK.

Pea coal demand increase and the anthracite steam sizes are in good call. Railroad are taking heavy tonnage of the latter to mix with their bituminous stocks. Egg, stove and chestnut continue to be in good demand. Domestic coals are sent westward before the close of navigation. Manufacturers are not hard hit by the soft coal strike. Stocks are large.

Anthracite—The soft coal strike has caused a bigger demand for the anthracite steam coals, most railroads taking heavy tonnages to mix with their bituminous supply. Pea coal which has been almost a drag since early summer has tightened and moving freely. The demand for egg, stove and chestnut continues strong.

Conditions, generally, do not show much change. There continues to be a heavy demand for the larger domestic coals principally from the west and shippers are diverting heavy tonnages there before the close of navigation the last week of this month. In the meantime, a fair tonnage is being placed in this section and in the New England States, where, salesmen claim there is great need for more coal. As soon as navigation on the lakes closes it is predicted that shippers will give more attention to the demand from the New England states and that the trade there will be given heavy tonnages.

In this market there is not an urgent demand although few yards boast of any large supplies. However, consumers are well fortified against the cold winds, in fact, they are better supplied with coal than in many years past, with the exception of last winter.

The reports received from the mining regions, while not altogether discouraging, are not encouraging. Mining is going on steadily but the workers, when so inclined, remain at home. The prospects of the bituminous workers securing an increase in wages does not add to the disposition of the hard coal workers to increase production.

although they are assured of a continuance of the present wage scale until April 1 of next year, even though Peace is declared by President Wilson. Many of the workers expect that at the expiration of the present working agreement their leaders will be able to negotiate a new agreement containing an increase in wages. The men in some of the mines declare their work is becoming harder and that they are entitled to more money on that account, if for no other reason. However, no trouble is looked for.

The present demand for the domestic coals will it is expected become easier and there are some who believe that within the next six weeks or two months salesmen will be out looking for business instead of the business looking for them as at present. Independent operators are generally adhering to the 75c differential on the domestic coals. Even though the demand for pea coal is strong no sales have been heard of at prices above the regular company circular of \$5.30 at the mines.

There is a strong demand for buckwheat and rice and the independents are receiving company prices for the better grades. Barley is easier. The railroads are said to be storing large quantities of buckwheat and rice to mix with their bituminous coal.

The reports of the railroad administration show a big increase in local dumpings during the 7-day period ending November 15, when 5583 cars were dumped as compared with 4564 cars the previous week.

Bituminous—The strike has not caused much trouble or anxiety to the manufacturers hereabouts. They seem to be unconcerned as to the immediate outcome and judging from the appearance of the stock piles surrounding many of the factories in suburban New Jersey they are justified in their unconcern. If appearances count for anything most manufacturers are better stocked with bituminous coal than in many years past and most of them have been able to get along with their daily shipments so far without resorting to their reserve stocks. Many claim to have sufficient coal on hand to last them until the latter part of February or the first part of March. The railroads appear to be the hardest hit by the present shutdown. They have taken up the burning of the anthracite steam coals, which are being mixed with bituminous.

Locally the situation as regards deliveries, has not changed. If reports are to be accepted, shipments from the piers have been greatly restricted and there has been no change in the matter of permits.

Those dealers who make a specialty of bunkering vessels complain of the present methods to secure permits, which they say is too prolonged and which may result in serious delay in sailing time for important ships.

This market has not yet felt the full effect of the strike. So many loaded cars were awaiting delivery to destination on Nov. 1 that the railroads have not yet been able to get them all delivered.

Reports of the Railroad Administration show that during the 7 day period ended Nov. 15 there were 5081 cars dumped at the local piers as compared with 2558 cars the week previous and that there were 6255 loaded cars at the terminals as compared with 5141 cars the previous week.

PHILADELPHIA.

Anthracite production increasing. Dealers in the city not satisfied with their receipts. Some look for early break in market. Consumers pressing strongly for deliveries. Egg, stove and nut the favorite sizes. Pea coal increasing in demand. Retail prices firmly fixed. Steam sizes active, except barley. Bituminous situation shows little change. Small tonnage of spot coal at Government price. Early settlement of trouble looked for.

Anthracite. With the biggest production for any month of the present year being reported by the operators, the local retail men are wondering why they did not get a greater percentage of shipments. It has always been estimated that new business amounts to 10 per cent. each year and

while the colliery production is up to that maximum at last, the receipts by local dealers have not increased in the same proportion. However, the operators intimate that the heavy tonnages to the outside markets have about ceased, and have actually stopped in some instances.

Despite the fact that the retailers are clamoring for heavier shipments, they cannot get away from the fact that they have delivered good tonnages of all sizes to customers beginning early in the summer and right up to this time. This coal has been put away by thousands not accustomed in pre-war days to store fuel for winter, with the result that it is the belief of many intelligent observers that the companies would not have to ship very heavily before the dealers would have more coal than they could deliver on current orders. It is predicted that if we have ordinary weather up to the first of the year that the demand will be such that the operators will have to put their salesmen on the road again in the endeavor to move the output. When the amount of coal that is stored away is considered, it would not cause any surprise should this happen even sooner.

During the past week the demand for coal gained momentum over the previous period. The consumer seemed to be deeply anxious to have more egg, stove and nut, and these sizes are just about as scarce now as they have been all season. While the call for egg is still strong, there is no doubt that it would not take very heavy shipments before this size would pile up in the yards. With stove and nut, though, the dealers have very heavy orders on their books for these sizes which would take a considerable tonnage to clean off. There is a faint suspicion that customers are placing orders with several dealers and thus duplicating the tonnage.

This consumer demand is not traceable so much to weather conditions, although the temperature is now normal or a little under for the time of the year. The real reason is found in the bituminous strike, which many people are fearful might affect the anthracite trade. With the adjustment of the soft coal difficulty there is expected to be a considerable easing up in the domestic anthracite demand.

While the scarcity of sizes has been such as in ordinary times to warrant increases in retail prices, yet no dealer has taken advantage of the situation, at least publicly, to advance the prices of the wanted sizes. With variations of five and ten cents the standard retail prices this month are as follows: Egg \$11.25, stove and nut \$11.50, and pea \$9.50. Despite the efforts of the operators to induce domestic consumption of buckwheat, very little of this size is handled by the retailers for domestic use.

Following its spurt early in the month pea coal is strengthening its position and the demand for it is such that the dealers with the big stocks are well satisfied at their foresight in taking in this size last summer. When the phone orders begin to call for half ton lots of this size, then the dealers know that the pea coal season has opened. Even with their big washeries in operation some of the large companies report that they are not filling the orders for pea as promptly as they would like to.

The anthracite steam situation also continues its improvement and this week a greater tonnage than ever was removed from the storage yards, and this would probably have been increased were it not for a shortage of labor at the storage plants. There has also been some picking up of rice. Barley is the only size that shows no particular strength.

As is usual in times of strong demand for coal, shipping houses report collections in the healthiest sort of condition. There are practically no outstanding accounts at this time, as the retail men are well able to conduct their business on a nearly cash basis. The retailer realizes that his method of payment has much to do with his shipments and as a consequence his financial standing at this time is all that could be desired.

Bituminous. So far as shipments are concerned the situation is most quiet, as little additional tonnage has

arrived in this market. There are a few houses who at the beginning of the week had a little coal to offer. This was due principally to stray cars received from wagon mines, and in still other instances where some operations were able to get under way to a very limited extent. The spot coal on the market, what little there was, was generally offered at a price of \$3.10, which is the Government price of \$2.95 plus the middle house commission of 15 cents. The distribution of fuel still continues in the hands of the railroad administration and they are drawing from stocks which have accumulated during the past two weeks. At this time there is no particular suffering for coal, and it is really felt that the trouble will be adjusted long before such a stage is reached.

BALTIMORE.

Rescinding of order for coal strike at instance of court found conditions tightening at Baltimore. Reserve on railroads was still large. Anthracite supplies very light.

Bituminous—When the Mine Workers leaders decided to obey the order of the court and formally call off the strike it found the coal trade here and the consumers in a constantly tightened condition. Many industries were approaching the time when they would be forced to ask the Government apportionment of fuel and some few were already in that class. The reserve afloat in command of the Government, however, was fairly large, as the Baltimore & Ohio Railroad alone had reported having a total of some 19,000 cars of soft coal on its lines, or about 950,000 tons, while the Western Maryland & Pennsylvania together probably had nearly that amount. Standing at Cumberland were 2,000 cars of coal consigned to Baltimore and at Brunswick there were 1,400, much of which, however, would have been distributed elsewhere in view of the fact that more than 5,500 cars of coal were standing at the tide water terminals here, including Curtis Bay, Canton and Locust Point. While the rescinding strike order came in mid-week the miners in Maryland, District 16, decided to discuss the affair on Thursday, and there was at once raised the prospect that little hope of a general resumption could be entertained before the following Monday. The coal trade here, faced with the fact that October saw a total loading on export account of 460,056 tons of cargo coal and 75,662 tons additional of bunker coal for these ships, or a grand total of 535,718 tons, an immense line of waiting foreign orders, more than thirty coal ships in port or coming on foreign account, is preparing in the present lull for a very busy period with the removal of the ban on export coal loading. To get in on this business in the near future the Western Maryland Railway has given a contract to the McLean Construction Co., for a new wooden pier, to cost about \$900,000 to replace the one destroyed at Port Covington here about two months ago.

Anthracite—The hard coal dealers of Baltimore are feeling the pinch on light shipment to this territory in many cases. The majority have filled all except their actual fall orders, although there are a few still behind on summer business, but the usual late line is developing and there is not enough coal to meet it. The small yard reserves are being allotted in most cases to persons with no coal in their cellars. The light run here is attributed to the fact that the government rushed all available empties into the soft coal region in order to be prepared for a record movement as soon as the strike was declared off.

Lake Markets

CLEVELAND.

Receipts of bituminous coal range from 75 to 300 carloads a day, compared with around 2000 cars a day in normal times. Pocahontas and anthracite receipts have improved some-

what. The lake trade recovery is scarcely noticeable.

Bituminous—Railroad sidings to the south of Cleveland are jammed with loaded cars of bituminous coal, according to reports, but receipts in Cleveland proper are no higher than a seventh of normal. Some days as high as 300 cars filter through the committee that is distributing coal in this district. Other days as few as 75 cars are reported coming through. No actual suffering has yet been reported, nor have any industries been compelled to shut down. Many are close to the deadline, however. Retailers are rationing domestic consumers, piling the few orders they will take down to one ton. Few complaints of the restoration of government prices are heard, inasmuch as \$2.35 for mine run and slack and \$2.60 for prepared sizes for No. 8 coal were not far from the prevailing quotation prior to Nov. 1. The local committee appears to be functioning well, and the bituminous situation is all that can be asked, considering conditions. Another week will see the No. 8 field operating at better than 50 per cent, it is felt, and the trade will be able to crawl along until a final settlement.

Pocahontas and anthracite—Receipts of these grades are approximately normal, especially of anthracite. With bituminous coal almost impossible to get, domestic consumers turned to the more expensive grades. So far prices have not been boosted, with the exception of Pocahontas mine run, which some dealers have advanced 25 cents. Dealers have pushed coke into the breach, and sales have tripled almost over night. Eleven dollars is asked for coke by most dealers.

Lake trade—Both weather and shipments to Lake Erie ports are conspiring to cut deeply into the lake trade. Last week the dock only loaded 161,380 tons of cargo bituminous and 14,888 tons of vessel fuel or about 11 per cent of normal for this time of the season. In no day recently have the docks dumped over 900 cars. Rough weather at the head of the Great Lakes has delayed the carriers considerably. Present shipments are the smallest of the season, and the outlook for improvement is bad.

Prices of coal per net ton delivered in Cleveland:

Anthracite—Egg, \$11.75 to \$11.90; Chestnut, \$12.00 to \$12.20; Grate, \$11.75 to \$11.90; Stove, \$11.90 to \$12.10.

Pocahontas—Forked lump, \$10.00 to \$10.50; Shoveled lump, \$10.00; Mine-run, \$7.90 to \$8.25.

Domestic bituminous—West Virginia splint, \$9.00; No. 8 Pittsburgh, \$6.60 to \$6.90; Massillon lump, \$8.25 to \$8.50; Cannel lump, \$10.50; Coshocton lump \$7.50.

Steam coal—No. 6 slack, \$5.25 to \$5.50; No. 8 slack, \$5.10 to \$5.50; Youghiogheny slack, \$5.25 to \$5.50; No. 8 1/2-in., \$6.00 to \$6.25; No. 6 mine-run, \$5.25 to \$5.50; No. 8 mine-run, \$5.75 to \$5.90.

CINCINNATI.

The market for all grades of coal in Cincinnati is quiet. Wholesale and retail dealers have a limited supply on hand. Household consumers have been taken care of by a special committee headed by the Federal Fuel Administrator of Ohio and Indiana. The quotations on all grades remained steady during the past week. Committees representing the wholesale and retail dealers are co-operating with the District Fuel Administration to keep this district supplied in fuel.

The supplies coming to the Queen City were drawn from the West Virginia fields. During the strike period, Cincinnati was indeed fortunate in being on the edge of the non-union fields and consequently no one suffered from a shortage of fuel, there being enough of the commodity moving to the city at all times to take care of the industrial needs of those who did not and those who could not store enough for emergencies. There was little call for help from the domestic consumers because about 80 per cent of them had heeded the warnings and had laid away their winter's supply early in the spring and summer.

The demand from the industrial users during the past week was unusually heavy and those from the domestic users, while not heavy, was enough to keep the dealers on the jump. The first touch of winter weather caused unprepared domestic users to clamor for coal and fortunately there was enough on hand to supply all wants.

When the strike became effective Nov. 1, coal men did not take advantage of the Government maximum prices which were from 50 cents to one dollar higher per ton than those prevailing among coal men prior to the strike.

Retail dealers at no time charged the limit allowed by the government because they felt it would be making unfair capital of a critical situation when co-operation and the maintenance of public confidence were vitally important, and also because any such radical changes in price would entail a great deal of revision and reorganization in the coal business throughout the city.

The indisposition on the part of the dealers to charge the full price allowed by the government has resulted in probable financial loss to some of them, for when they were obliged to sell coal distributed by the Fuel Administrations through the railroads, they paid full government prices. Frequently the dealer did not know at the time when he sold his coal to the domestic consumer whether he was making a sale at profit or at a loss, because the local coal committee has not been able to furnish invoices simultaneously with the allotments of coal to the dealers.

According to Cincinnati retail dealers the domestic consumers are being charged about \$7.25 per ton for high grade bituminous coal for use in homes. This was not the maximum price allowed by the government and therefore, the fact that the Fuel Administration removes the limit which can be charged for retail coal will not have any effect in prices so far as the domestic consumer is concerned was the assurance given by various coal merchants. Prices of coal in Cincinnati delivered, follow:

Bituminous, \$7.50; Run of mine, \$6.50; Smokeless lump and egg, \$8.00, \$8.50 and \$9.00; Run of mine, \$7.00 and \$7.50; Anthracite \$10.50 and \$12.75; Coke, domestic egg, \$10.50 and \$11.

BUFFALO.

No local effect of the coal strike apparent. Practically no one asking for bituminous coal. Shippers afraid that the expected return to mines will be disastrous. No change in anthracite.

Bituminous—The calling off of the strike gave the situation a new phase, but it is too early now to say what will be the actual result. This market was feeling quite comfortable over the outlook. If there was any consumer with shortage who was short of supply or had less than a six-weeks' stock the shippers did not know him. So it is a mere matter of sentiment with the shippers to rejoice over what appears to be the triumph of a new principle in the strike problem.

As it stood here there was practically nobody asking for coal. Even pictures were published showing big piles of coal that had been delivered to outlying consumers. The Buffalo shipper did his full duty by his customers. He fairly obliged them to put in a stock. Now he is nearly out of business and does not expect orders of any amount for weeks to come. He was quite prepared to sit down and wait for the strike to die out as the steel-workers' strike did.

There are a great many cars standing on tracks here and on the way from the mines. The railroads generally refuse to release them except by government order. A local committee has classified the coal and when a consumer asks for a certain grade or sort it can then be turned over at once. No distress is likely, even if the men are slow to go back to work. The average jobber is so entirely without orders that he rather hopes that they will take their time about it.

The bituminous prices are hardly visible in any form just now, but they will continue as before if nothing radical happens at \$4.55 for Allegheny

Valley sizes, \$4.80 for Pittsburgh and No. 8 lump, \$4.65 for same three-quarter \$4.20 for mine run, \$4.10 for slack, \$4.70 for smokeless \$5.70 for Pennsylvania smokeless, \$7.75 for coke, domestic sizes and \$5 for breeze, all per net ton, f. o. b. Buffalo.

Anthracite—The situation does not change materially, except that there is no report now of big premiums paid on independent coal. The government stand on the matter seems to have sopped it. Locally the supply is as light as ever and the rail-line business is still slack. Some of the lake shippers are now closing out that branch of the business for the season and will give the local and line trade all the coal asked for. The fall has been so mild that consumption is at its lowest, which cannot help making the supply much more than it would otherwise be.

Shipments by lake are falling off. The amount forwarded is so much more than it was last season to date, though, that there ought to be a good supply in upper-lake territory. For the week the loadings totaled 97,950 net tons, of which 43,300 tons cleared for Duluth and Superior, 27,200 tons for Milwaukee, 7,200 tons for Fort William, 7,000 tons for Sheboygan, 5,600 tons for Chicago, 5,000 tons for Vanitowce and 1,750 tons for Lake Linden.

Coal freight rates are weak, from the scarcity of other freight, at 60 cents to Chicago, 47 1/2 cents to Milwaukee, 42 1/2 cents to Duluth, Fort William, Sheboygan, Manitowoc, Lake Linden.

Coke

Buffalo—The trade is pretty slack, for there is a big stock of both coke and ore available and the output of iron and steel is not yet up to the normal and there is no need of haste in laying in more. Hardware dealers and the like are finding themselves out of certain supplies that they cannot get, but it may be quite a long time before they can get them again, for the supply is likely to be less than the demand for quite awhile. The prices of coke still rule at \$8 for 72-hour Connellsville foundry, \$7.50 for 48-hour furnace and \$7 for off grades, all per net ton, f. o. b. Buffalo.

DETROIT.

Detroit and most of the other towns of the state are reported fairly well supplied with bituminous coal.

Bituminous—Under the method of distribution made effective by the government's regional committees, few complaints of shortage of coal are received from towns in Michigan, despite the suspension of a large part of the production. Coal is coming to Detroit in liberal supply, according to jobbers. P. G. Finlay, head of the local regional committee, is turning over a considerable amount to consumers who are in the four priority groups following railroads, and is urging that cars be unloaded as swiftly as possible to facilitate relieving local terminal tracks.

Investigation by the Detroit Board of Commerce elicited the reassuring information that there is sufficient bituminous coal at hand to meet the requirements of the city's manufacturing plants for about three weeks. While some of the retailers are reported to have little bituminous coal in their yards, the present situation is helping to relieve others of the residue of stocks that were left over from the former regime of the federal fuel administration.

It is so far a matter of congratulation among the local jobbers that Dr. Garfield has not restored the wearisome system of reports that added to the trials of these dealers a year ago. There is some speculation also, as to how long the fuel administration will continue to function after termination of the strike.

Anthracite—With stocks of prepared sizes of anthracite low in retailers' yards and very little coal of that description coming to Detroit, household consumers, who neglected to stock up early in the year are viewing the outlook with anxiety. Jobbers are not inclined to encourage the theory that

receipts of anthracite will be increased after the end of navigation on the lakes. They argue that the demand from eastern markets is likely to absorb whatever additional supply may be made available.

Lake trade—Lake freighters are again assured of coal for bunker use and coal is being released also for loading for delivery at points on the upper lakes where present supplies are held to be inadequate to meet winter requirements. Bunker coal is being released also to Canadian freighters, which for a time were cut off from fuel. The purpose is to facilitate movement of grain down the lakes.

COLUMBUS.

While the strike order has been cancelled by the officials of the Miners' Union, very few miners have returned to work in Ohio. Some few mines have opened but they are generally small and production is still almost nil. It is doubtful if there will be much production before the settlement of the wage scale, or until some definite move is made by the international officials.

There is still a strong demand for coal, both domestic and steam grades in Ohio as production with the cancelling of the strike order has not yet been resumed. The federal authorities still retain control of the distribution of coal and every one who is in dire need is being supplied. The first attention of the local distributor B. F. Nigh was to relieve retailers, hospitals and other public institutions. Quite a few applications for coal to take care of such cases were received and after investigation orders were given to move coal promptly. A large amount of coal is still being held on the tracks in the Columbus area. Retail stocks are getting low and most of the dealers have to depend on the fuel distributing machinery for their supply. It has been the rule to deliver smaller lots to customers in order that all can be served. Retail prices are firm at the levels which prevailed, although some reductions are reported where the coal sold was purchased at the government prices. Pocahontas is quite scarce and the same is true of West Virginia splints.

Steam trade is also firm and steam orders are buying all available stocks. But in most instances the larger consumers had accumulated reserves which are carrying them through the emergency. Railroads are confiscating a considerable tonnage but not as much as was expected. In fact every one is going slow in making requisitions. Steam prices remain firm at former levels and no especial reduction has been made. Hocking mine-run is selling at \$5.25 to \$5.50 delivered, while West Virginia mine-run is selling around \$7.50 delivered.

Some tonnage is going to the lakes but not sufficient to make any records. There is still a shortage of fuel in the Northwest and the lake trade will probably run on until the closing of navigation. But the large majority of contracts have been filled.

Miners in all Ohio producing fields are slow in returning to work, following the cancellation of the strike order. It is called to attention that the cancellation of the strike order did not command miners to return and it is believed it will require some time before production is being done on a fair scale. Many of the miners are waiting to see the results of the Washington wage conference before returning to work.

PITTSBURGH.

Few miners return to work thus far. Coal consumers feel little concern. Price regulations.

Few miners returned to work in the Pittsburgh district immediately on the calling off of the strike, pursuant to the injunction of the Federal Court, but the expectation is that beginning Monday, Nov. 17, there will be a fairly general return. Some of the small union mines are working fairly well, a few of these have not stopped work at all. The non-union districts are all working and some are producing practically record tonnages.

The Railroad Administration has re-

leased to original consignees little of the coal it has been holding, much of this being on railroad company sidings adjacent to points of delivery. The steel industry is no longer seriously concerned over the coal strike as it had fair stocks for a short cessation in production and it is expected that the consigned coal held will be released shortly.

The Pittsburgh Coal Producers' Association has been notified by J. D. A. Morrow, of the Fuel Administration, of certain modification in the price order originally issued. Coal shipped on or before Oct. 29 is to be billed at contract or invoice price and if diverted the producer can add 15c to cover cost of rebilling, hauling, etc., while all coal shipped Nov. 13 and later on a contract made prior to Oct. 30 is to be billed at original price, no rebilling charge being allowed. All coal shipped after Nov. 13, not on contract, is subject to Government price, and to rebilling charge of 15c if diverted. Thus the Pittsburgh district market is quotable at \$2.35 and \$2.50 for mine-run and 25c higher for screened, per net ton at mine.

Coke

CONNELLVILLE

Coke operators very firm on prices. Increased costs expected. Large increase in coke production in first week of coal strike.

Coke operators interpreted the calling off of the coal strike as being favorable to the maintenance of coke prices, on the ground that the ending of the coal strike would stimulate the iron and steel industry and help to get its strike out of the way. Operators express the opinion that a wage advance of considerable proportions will eventually be given the union coal miners and that the Connellsville region, although non-union, will follow with a proportionate advance. A considerable increase in the cost of making coke therefore, is taken into account in connection with negotiations for coke to be delivered in 1920. A prominent producer of foundry coke made a number of contracts with regular customers for the first half of 1920, on the basis of \$7.00 for foundry coke, plus an extra dependent upon any wage advances that may come to prevail, then withdrawing from the market.

In the case of furnace coke it is reported that one or two operators have been ready to close at \$5.50 for the half year, without any allowance in addition for wage advance, but operators in general are indisposed to negotiate until the wage matter is settled. Operators are again talking of sliding scale contracts, even though the contracts made on that basis for the present half year did not justify their expectations, since for four months pig iron did not advance.

The prompt market is quotable at about \$6 for furnace coke and \$7@7.50 for foundry coke, per net ton at oven.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Nov. 8 at 248,676 tons, an increase of 46,175 tons.

Middle West

MIDWEST REVIEW.

No great results, as yet, have been derived from Mr. Lewis' withdrawal of the strike order. Far from rushing back to work and a place on the payroll, the mine workers are living on their accrued incomes, and with their families, friends and automobiles, are enjoying the beautiful Indian Summer weather. This may sound like irony, sarcasm, or an attempt at humor, but as a matter of fact, it is the absolute truth. One of our friends chanced to be in an Illinois mining town about a month ago, and he counted over 70 automobiles parked in the vicinity of one coal tippie. It certainly is a great thing for the miners to own automobiles, and we have nothing against this, but unfortunately it weakens

their cry of poverty. The public will always listen to a plea for bread or a like necessity, but not much sympathy can be expected for strikers desiring more money for gasoline or silk shirts.

While the strike, as a matter of fact, has been called off, the situation has not changed a particle, as to date no operator has been able to report that his men are back at work. Some mine owners are predicting that the mines will remain practically idle until around the first of December, basing their prophecy on the fact that practically all the miners in Illinois and Indiana have a big pay coming to them on November 15. It is said that this pay, in a general way, will prove the biggest for the fiscal year. This will give the mine workers considerable cash in hand, and no doubt will put them all in an independent mood.

No reports, so far, have come in, telling of hardships incurred through a coal shortage. Today, the temporary machinery of the Fuel Administration, combined with the Railway Administration has proved able to handle the situation well. It now appears to be the state with the smallest supply, while both Indiana and Illinois have ample. This applies both to retail yards and steam plants. If the men go back to work promptly, it is believed that enough coal can be produced to keep plants running and homes warm.

CHICAGO REVIEW.

There is practically no activity in the coal market here, except on the part of the retail dealers who are doing a rushing business, one and all. These gentlemen evidently have an abounding faith in the future, as they are all reducing their stocks very rapidly. Every now and then the local representative of the Fuel Administration releases some coal to the retail trade, but not enough to make up for the large tonnage delivered to the householders almost daily.

The operators are doing nothing, and the jobbers find themselves almost in the same fix, except that some are selling coke, while others are distributing a small tonnage of coal from wagon mines, and from the anthracite regions. No great activities can be looked for in the wholesale trade until the miners resume work.

MILWAUKEE.

Coal market normal, despite the general disturbance. Good stocks on hand, but chestnut and stove anthracite are scarce. Prices unchanged.

The coal market at Milwaukee is normal, notwithstanding the disturbing element which beset the trade at large. There has never been any fear of a shortage in case of a strike, because consumers are fairly well supplied and the docks are piled high with bituminous coal. Only a prolonged and unusually cold winter would exhaust stocks in the yards. Some small dealers have suffered inconvenience because rail shipments of Pocahontas coal have been taken over by the coal administration, and shipments of steam coal to the interior have been held up by the temporary embargo on the movement of bituminous coal, but the situation is viewed with complacency by coal men as a rule. There is a scarcity of chestnut and stove anthracite, which makes it hard for dealers to meet the wants of consumers with magazine heaters, otherwise deliveries are being freely made. Wintry weather has stimulated business. Receipts by lake are the slowest of the season, averaging one cargo a day thus far in November. Receipts for the season thus far total 794,264 tons of anthracite and 2,792,895 tons of soft coal, a gain of 146,316 tons of the former, and a falling off of 395,469 tons of the latter compared with the record of the same period last year.

Coal fires are still burning in the yards of the Central Coal Co., Kana-wha Fuel Co. and Milwaukee Western Fuel Co. Thousands of tons of soft coal are being consumed or converted into coke. The Pugh yard at Racine, Wis., is also burning.

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Yes, sir—certainty that my boilers are being protected against the sudden reversal of steam flow is always at hand.

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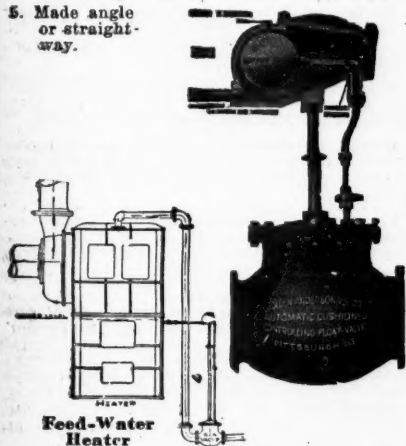
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"No shut-down when a tube bursts"

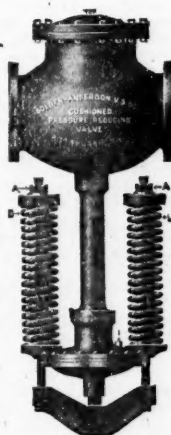
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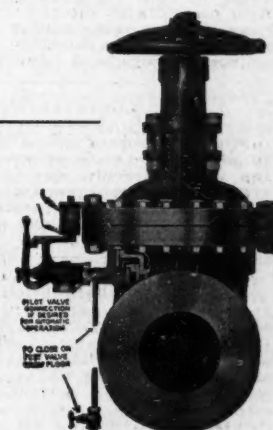


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Features:

1. Electrically operated from distant points.
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ST. LOUIS.

Railroad Administration distributing what coal is available locally. Present supply fairly good in city while country districts are suffering.

The local situation is fairly good, everything considered. No restrictions have been put on in regard to the conservation of fuel, although they are supposed to exist in a limited way.

The Regional Fuel Committee have now the assistance of a few practical coal men and things are working out fairly well.

In the country districts, however, it is different. People who need coal can go up and get it as a rule, but the steam users and the dealer in the country districts who is unable to get to St. Louis and who has no information as to how to get coal is without it and from many places throughout the southwest, reports come in that electric light plants and other users are down because of no fuel.

In many places the retail trade in the country had not coal for the past couple of weeks. These communities have to use wood when they can get it or go without fuel.

The railroads have been very liberal locally with coal as far as steam plants are concerned and have shown a better disposition than was expected. It is a known fact that several railroads are hard up for coal at this time, but nevertheless they have as yet not refused any request for coal here.

The car supply at the mines will be one hundred per cent for perhaps a week or ten days when they resume. The only thing that worries the operators now is when the miners will go back to work, and whether the railroads will be able to handle the coal when it is produced.

Storage supplies are getting low in St. Louis, and the first week will likely find the railroads and steam plants taking most of the coal.

The feeling here is that there will be very little doing in the Standard and Mount Olive districts until the miners know exactly what they are going to get. They say they are not going back to work until the wage scale is settled. The first to go back in Illinois may be those in the Williamson and Franklin County fields, the miners there being more conservative, and the last to go back will be those in the fifth, ninth and Springfield districts in Illinois. If they continue to stay out another week or ten days, all the available coal in this section in cars will have been used.

LOUISVILLE.

Miners reported going back to work in all fields. Cold weather not creating much domestic demand. Railroads still holding coal consigned to industrial consumers and retailers. Market expected to slowly get back into a normal stride.

Leading operators report that things are working back toward normal, and that the loss of eleven days work in the mines will not be seriously missed inasmuch as the country was fairly well stocked on all grades of coal. However, in Southeastern Kentucky and the Southern Appalachian district, miners didn't go back to work the day following the calling off of the strike. In some cases official notice had been delayed. Many of the miners were dissatisfied, and in some sections it is believed they will hardly report until Monday. Northeastern Kentucky reports that mines are filling up fast and that operations will soon be on a normal basis. In Western Kentucky men were eager to get back to work, and mines are producing well.

However, it is held that in some sections miners are dissatisfied, and will not work with much energy, with the result that production will be lower and more costly for the operator.

During the last few days of the strike production on the L. & N. lines in Kentucky was equal to about 50 per cent normal operation, due to heavy tonnage movement from Western Kentucky, where forty-seven union mines were working; and from the Hazard field where operations were nearly normal, while from Harlan districts

fair tonnage was moved as a result of the monster plant of the U. S. Coal and Coke Co., running at capacity, as well as the plant of the Wisconsin Steel Co.

River shipments as a whole are very light, although there is a big river at the present time and boats would have no trouble in getting through.

Much coal is still held by the railroads to the detriment of retail business, as many retailers have consigned coal in the yards and can't get it. The same thing applies to a number of industrial consumers, and many towns out in the state are complaining of the shortage.

Nov. 13, with a drop to 23 degrees, registered the coldest weather of the season, and since 1873. However, it failed to produce much retail demand as consumers are well stocked.

Producers openly state that they would rather see miners get a slight increase and get the trouble over with, than have it dangling for months. Signing of the peace treaty would probably be the signal for another strike, and while it is not felt that miners are entitled to more money until the old agreement runs out, it is felt that peace must be secured.

Just how soon price regulation will be withdrawn is a question, but it is generally understood in the trade that Garfield's work is completed with the calling off of the strike, and that things will go on much as they did before the trouble started.

BIRMINGHAM, ALA.

Mine workers returning to their labors rapidly and coal production is now around 75 per cent normal. Steam demand is not urgent, neither are inquiries for domestic sizes.

Mine labor throughout the Alabama field, with the exception of those formerly employed in the Cahaba collieries, are reporting for work at the mines and are being taken on as rapidly as practicable at the plants which have been idle or partially so during the strike. It is reported that few of the men have reported for work in the Cahaba field, where the largest tonnage of domestic coal is mined, but they are expected to return the first of the week, and within a few days thereafter normal output will be obtained in this section of the field.

Notwithstanding the fact that coal production was reduced to probably 25 per cent of the normal output during the first few days of labor trouble and was gradually brought up to 60 to 70 per cent normal at the time the strike call was rescinded, there has been no shortage of consequence suffered by either the steam or domestic consuming public, and few complaints were registered on account of scarcity of fuel during the strike period. At present there is only a moderate demand for steam fuel, but with contract deliveries behind there will be little surplus coal available for several weeks. Steam and domestic prices are as follows per net ton mines as per Government schedule now in force:

	R/M	Slack	Lump
Big Seam	\$2.45	\$2.40	\$2.75
Cahaba, Black Creek. 3.45	3.40	3.75	
Pratt and Corona ...	2.85	2.45	3.05
Montevallo	4.10	3.60	4.35
Climax	4.60	2.50	4.85

The railroads are now forwarding to destination as rapidly as possible the large tonnage of fuel which they have been holding in yards and sidings since the beginning of the strike, and while the car supply is now plentiful a shortage may develop pending the return to the mines of the loaded equipment, much of which was diverted from other transportation channels and may not be returned to the coal fields.

Foreign Markets

TORONTO, CANADA.

Bituminous shipments held up at the border. War stock piles being drawn upon. Storage not seriously felt as yet. Anthracite supply about equal to demand.

No shipments of bituminous coal have lately been received from the mines, all consignments having been held up at the border by the American Government. Some soft coal is being brought in from war stock piles at outside points of the province, which is selling wholesale at \$9.60 per ton on cars at Toronto. The shortage has not so far been seriously felt or resulted in anything like a panic, the principal danger being the near exhaustion of supplies for the Gas Company which is a very large consumer. Supplies of anthracite are light but about equal to the present demand, most consumers having laid in their winter stocks.

Retail quotations for short tons are as follows:

Anthracite, egg, stove, nut and grate	12.50
Pea	11.00
Bituminous steam	8.75
Slack	7.75
Domestic lump	10.00
Cannel	11.50

Recent Coal Patents

Automatic stoker. H. G. Lee, Tacoma, Wash. 1,311,524, July 29, 1919. Filed May 14, 1917. Serial No. 168,335.

Mining car. C. H. Lubken, Westmont Borough, Penn. 1,311,659, July 29, 1919. Filed June 17, 1918. Serial No. 240,312.

Coal drill. C. F. Helfinger, Durham, Wash. 1,311,396, July 29, 1919. Filed Nov. 7, 1917. Serial No. 200,669.

Mechanical stoker. J. Van Brunt, assignor to Combustion Engineering Corporation, New York, N. Y. 1,309,344, July 8, 1919. Filed May 21, 1918. Serial No. 225,797.

Automatic stoker. E. J. Hart, Philadelphia, Penn. 1,312,397, August 5, 1919. Filed May 26, 1917. Serial No. 171,087.

Mining bit. I. Hubbell, Peoria, Ill. 1,312,732, Aug. 12, 1918. Filed Nov. 26, 1917. Serial No. 204,011.

Safety cartridge for mining purposes. E. Lemaire, Mons, Bel. 1,310,616, July 22, 1919. Filed Dec. 26, 1916. Serial No. 189,066.

Mine door operating means. J. J. Body, L. Long and M. L. Johnson, of Dante, Va., C. F. Kilgore and A. Blevins, of Coeburn, Va. 1,311,483, July 29, 1919. Filed Jan. 16, 1919. Serial No. 271,452.

Method of treating mine water. E. C. Auld and J. R. Campbell, Scottsdale, Penn. 1,310,382, July 15, 1919. Filed May 8, 1916. Serial No. 96,232.

Briquetting fine dust. F. A. Vogel, assignor to General Briquetting Co., New York, N. Y. 1,312,218, Aug. 5, 1919. Filed Oct. 26, 1918. Serial No. 259,806.

Mining machine. C. B. Officer, assignor to Sullivan Machinery Co., Claremont, N. H. 1,313,869, Aug. 19, 1919. Filed Dec. 5, 1917. Serial No. 205,649.

Apparatus for the distillation of coal. A. Pinet and A. Debout, Paris, France. 1,312,352, August 5, 1919. Filed July 17, 1915. Serial No. 40,525.

Mining machine. M. P. Holmes assignor to Sullivan Machinery Co., Claremont, N. H. 1,303,797. May 13, 1919. Filed April 22, 1914. Serial No. 833,782.

Apparatus for loading coal. E. C. Morgan, Chicago, Ill. 1,304,084. May 20, 1919. Filed Sept. 3, 1914. Serial No. 859,976.

Releasing wrench for coal cars. H. M. Pfister, Binghamton, N. Y. 1,304,090. May 20, 1919. Filed Oct. 23, 1914. Serial No. 868,244.

Process of briquetting. F. A. Jordan assignor to Moose Mountain, Ltd., Sellwood, Can. 1,304,186. May 20, 1919. Filed May 29, 1915. Serial No. 31,117.

Apparatus for mining. E. C. Morgan, Chicago, Ill. 1,304,352. May 20, 1919. Filed July 5, 1913. Serial No. 777,435.

Coal loading machine. H. T. Franklin, Daumont, W. Va. 1,304,869. May 27, 1919. Filed Nov. 26, 1918. Serial No. 264,194.

Dump car. H. S. Hart, Chicago, Ill. 1,304,969. May 27, 1919. Filed Oct. 21, 1918. Serial No. 258,989.

Mine drill. F. Kalata, Springfield, Ill. 1,305,219. May 27, 1919. Filed Jan. 24, 1919. Serial No. 272,849.

Mine skip. D. F. Lepley, Connellsville, Penn. 1,304,784. May 27, 1919. Filed Jan. 17, 1919. Serial No. 271,661.